CONSEIL PERMANENT INTERNATIONAL POUR
L'EXPLORATION DE LA MER
34 B. STRANDVEJ, HELLERUP. — DANEMARK

RAPPORTS
ET
PROCÈS-VERBAUX DES RÉUNIONS

VOLUME XCIV

2ÈME PARTIE

RAPPORT ADMINISTRATIF

(1934—1935)

EN COMMISSION CHEZ
ANDR. FRED. HØST & FILS
COPENHAGUE

Prix: Kr. 3.50.

Juillet 1935.

NOTICE

The annual Procès-Verbaux des Réunions will be issued in three parts under the same volume-number:

1° Report of Proceedings at the annual Council Meeting,

2° Administrative Reports for the past year, and

3° Appendices to reports and proceedings, i. e., minor reports to administrative reports and papers read at Committee meetings.

Each part will be published separately and issued as soon as possible.

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Copenhague — Imprimerie Bianco Luno A/S.

REPORT

of

ADMINISTRATION 1934—1935.

I. General.

position of the International Council for the Exploration of the Sea.

ing the year 1934—35 no change has occurred the composition of the International Council in t of adhering countries. As regards Delegates en has advised that Professor N. O. ZEILON has appointed Delegate of Sweden instead of Pro- HANS PETTERSSON, and Germany that Professor . HAGMEIER has been appointed second Delegate rmany.

Composition of the Bureau.

change as to the composition of the Bureau has place during the past year, and the Bureau thus sts of:— Mr. H. G. MAURICE, President; Professor N HJORT, M. THÉODORE TISSIER, Dr. C. HEINRICI Professor MARTIN KNUDSEN, Vice-Presidents; — ssor OTTO PETTERSSON is Président D'Honneur the right to attend meetings of the Bureau.

Committees.

ist of the Committees will be found in the Procès- aux of the last Council Meeting. These Commit- remain in being, with a few changes mentioned as to membership, and continue their activities. ie Council Meeting last year Dr. A. BÜCKMANN elected Chairman of the Southern North Sea nittee, and Dr. R. S. CLARK Honorary Vice- man of the Northern North Sea Committee on nt of Dr. A. BOWMAN's illness, which unfortun- has forced Dr. BOWMAN now to retire from e participation in the work of the Council. ugh the lamentable death of Professor L. JOUBIN Atlantic Slope and the Editorial Committees have lost this member. The following appointments as to representation of Germany on various Committees have been announced:— North Western Area: Professor A. HAGMEIER; Atlantic Committee: Dr. C. HEINRICI (failing him Professor HAGMEIER); Combined North Sea Committee: Dr. W. SCHNAKENBECK and Dr. BÜCKMANN; Northern North Sea Committee: Dr. SCHNAKENBECK; Baltic Committee: Dr. E. FISCHER and Dr. v. BUDDENBROCK; Salmon and Trout Committee: Dr. A. WILLER; Editorial Committee: failing Professor E. EHRENBAUM, Dr. HEINRICI.

Audit of Accounts.

The Accounts of the Council for 1933—34, audited by a qualified accountant prior to the last Council Meeting have since been examined and found correct by the Finance Committee, and will be submitted to the Council for final approval.

A preliminary Income and Expenditure Account is given below for 1934—35; this has to be audited and examined by the Finance Committee. The statement is prepared in accordance with that of last year, i. e. with a balance sheet showing a complete statement of the Council's Capital, Assets and Liabilities. A similar statement of the Pension Fund Account is appended separately.

The Income and Expenditure Account as compared with the Estimates gives rise to the following remarks:

Income. On the 31st of March Receipts for the year amounted to Kr. 92,000 as against Kr. 74,000 last year, since then Kr. 60,000 have been paid into the account showing outstanding contributions to-day amounting to Kr. 5,000 as against Kr. 35,000 last year. Interests on Bank Deposits have this year produced Kr. 7,220.14 against the estimated Kr. 7,000, and the sale of publications Kr. 2,267.66

Income and Expenditure Account for the year ending March 31st 19

EXPENDITURE

		Estimates	Expenditure	
	I. Incidentals			
1	President		5,925.00	
2	Chairman of Editorial Committee		1,975.00	
3	Hydrogr. Consultant	*16,800.00*	2,975.00	
4	Editor of Statistics		1,975.00	
5	Editors of Journal		3,950.00	
				16,800.00
	II. Administrative Staff			
6	Adm. Secretary		10,000.00	
7	1st Asst. Secretary	*25,800.00*	6,000.00	
8	2nd — —		5,000.00	
9	Statistical —		4,800.00	
				25,800.00
	Hydrographic Staff			
10	Hydrographer		4,500.00	
11	Hydr. Secretary	*10,500.00*	3,000.00	
12	— Assistance		2,400.00	
13	Clerical Secretary		600.00	
				10,500.00
	III. Office Expenditure			
14a	Rent		4,500.00	
b	Clerical Assistance		2,400.00	
c	Light and Heating		1,415.35	
d	Stationery, Books, etc.		1,986.29	
e	Teleph., Telegr., Postage	*16,000.00*	1,546.59	
f	Furniture and Fittings		2,170.00	
g	Insurance		196.30	
h	Upkeep, Cleaning, Rep.		1,861.10	
i	Miscellaneous		1,042.82	
				17,118.45
15	**IV. Travelling Expenses**	*12,000.00*	7,430.38	7,430.38
16	**V. Chairmen of Committees**	*31,387.50*	30,675.00	30,675.00
17	**VI. Printing and Distribution**	*37,500.00*	30,739.01	30,739.01
	Ordinary Expenditure	*149,987.50*		139,062.84
	VII. Extraordinary Expenditure			
18	Cost of production of Prof. JOUBIN's Faun.) Ichthyologique	*2,500.00*	2,707.86	
19	Honorarium to Prof. JOUBIN	*1,000.00*	1,000.00	
				3,707.86
	VIII. Pension Fund			
20	Transferred according to Standing Resolution	*3,500.00*	3,500.00	
21	Refund of Pensions	*9,807.00*	9,806.44	
				13,306.44
	Total Expenditure	*166,794.50*		156,077.14
	Excess of Income over Expenditure			10,410.66
				Kr. 166,487.80

INCOME

		Estimates	Income	
	I. Annual Contributions [1]			
	Participating countries:			
	France $^{9}/_{3}$ 35 1934—35	*20,000*	20,000.00	
	Germany $^{28}/_{9}$ 34 —	*20,000*	20,000.00	
	Great Britain $^{29}/_{4}$ 35 —	*20,000*	20,000.00	
	Spain $^{26}/_{4}$ 35 —	*20,000*	20,000.00	
	Belgium $^{5}/_{4}$ 35 —	*10,000*	10,000.00	
	Denmark $^{7}/_{3}$ 35 —	*10,000*	10,000.00	
	Holland $^{6}/_{5}$ 35 —	*10,000*	10,000.00	
	Norway $^{28}/_{2}$ 35 —	*10,000*	10,000.00	
	Poland $^{22}/_{12}$ 34 —	*10,000*	10,000.00	
	Sweden $^{18}/_{7}$ 34 —	*10,000*	10,000.00	
	Finland —	*5,000*		
	Irish Free State $^{23}/_{3}$ 35 —	*5,000*	5,000.00	
	Portugal $^{26}/_{1}$ 35 —	*5,000*	5,000.00	
	Other countries:			
	Latvia $^{25}/_{2}$ 35	*2,000*	2,000.00	
		157,000		152,0
II.	Outstanding as per $^{10}/_{5}$ 1935			5,0
III.	Interests on Bank Deposits	*1,000*	1,220.14	
	Interests on Investments	*6,000*	6,000.00	
		7,000		7,2
IV.	Sale of Publications	*2,000*	2,267.66	2,2
		Kr. *166,000*		

[1]) The dates after the name of the country indicate the date of the payment to the office.

Kr. 166,48

Statement of Pension Fund Accounts 1934—35.

EXPENDITURE		INCOME	
Drechsel's pension	6,500.00	Balance as per April 1st, 1934	33,652.27
Schøning's pension	3,306.44	Transferred from revenue	3,500.00
ce as per March 31st, 1935	39,018.60	Refund of pensions paid	9,806.44
		Interests	1,866.33
Kr.	48,825.04	Kr.	48,825.04

Balance Sheet 31st March, 1935.

LIABILITIES			ASSETS		
l Reserve:			Cash at Bankers	48,930.98	
Balance per April 1st, 1934..	227,428.72		— - Savingsbank	4,265.49	
Excess of Income over Expenditure	10,410.66		— in hand	4,958.50	58,154.97
Balance as per March 31st, 1935		237,839.38	Danish Treasury Bonds (nom. value Kr. 120,000; market value on March 31st, 1935, Kr. 124,800) at cost		118,543.43
Pension Fund		39,018.60	Pension Fund:		
Sundry Creditors as per March 31st, 1935		5,073.02	Cash at bankers	209.64	
			Danish Treasury Bonds (nom. value Kr. 38,700; market value on March 31st, 1935, Kr. 39,898) at cost	38,808.96	39,018.60
			Sundry Debtors as per March 31st, 1935		66,214.00 [1]
		Kr. 281,931.00			Kr. 281,931.00

[1] Furthermore Rbl. 14,430.54 (Russian Contr. 1914/15) deposited in a Leningrad Bank from which it has not yet been possible to withdraw it. — At May 10th "Sundry debtors" had decreased to Kr. 5,000 only.

inst Kr. 2,000). The total income thus amounts Kr. 166,487.80 or Kr. 487.80 over and above Estimates.

xpenditure. The items 1 to 13 do not give rise to remarks. Item 14 has been exceeded by Kr. 8.45 due to the renewal of typewriters, while item hows a saving of Kr. 4,569.62. As regards public- ns, item 17, shows a saving of Kr. 6,760.99 due y to the fact that publications did not reach number of pages anticipated. Other items on the enditure Accounts agree fairly closely with e estimated and the total expenditure thus unts to Kr. 156,077.14 as against the Estimate Kr. 166,794.50.

n excess of Expenditure over Income was indicated he Estimates of last year, but owing to saving on velling Expenses and Printing in particular the ome thus exceed the Expenditure by Kr. 10,410.66, ch added to the Capital Balance of last year, s a total Balance of Kr. 237,839.38.

he capital of the Pension Fund added to this figure shows a balance of total reserve of Kr. 276,857.98 as against Kr. 261,080.93 last year.

Meetings.

Meetings of the Bureau, attended by all members and by the Administrative Secretary were held in June 1934 and April 1935 in Copenhagen and London respectively. In the course of the year Professor M. Siedlecki attended the International Geographical Congress at Warsaw as a representative of the Council. No special meetings have been held during the year.

II. Work of the Office in Copenhagen.

The ordinary administrative work, correspondence etc. has been carried out on the customary lines and does not give rise to any special report. The usual statements as to publications, hydrographical and statistical departments are given below.

A. Publications.

Report regarding publications issued and cost of same during the financial year 1934—3

Series	Volume	Pages	Subject		Estimated	
Rapp. & Procès-Verbaux	LXXXVIII	(100) 96	N.E. Area Report cost	Kr. 2,584.59		
			less transfer from last year	— 2,500.00		
					—	
—	LXXXIX	(250) 244	Procès-Verbaux		*6.000*	5,(
—	XC	(100) 78	Rep. of Scient. Biol. Meeting		*2,000*	1,8
—	XCI	(50) 28	Rep. of the Meeting of Salmon and Trout Experts in Poland		*1,500*	
—	XCII	(75) 64	Salmon in the Baltic Precincts		*1,500*	1,4
—	XCIII	(100) 36	Rapp. Atlantique		*2,000*	
Bulletins		120	Bulletin Hydrograph. 1933	Kr. 4,836.49		
			less 29 pp. published at the cost of the Woods Hole Oceanographic Institution.	— 1,160.00		
					4,500	3,6
—			Thermograms		*300*	2
—			Bulletin Statistique 1932		*2,500*	2,2
Journal du Conseil	IX, 1—3	456		Kr. 7,561.20		
			less advertisements	— 222.70		
					8,000	7,3
Other printed matters relating to publications					*1,400*	5
				Total...	*29,700*	24,4
			Other costs of publications:			
			Translations etc		*3,000*	9
			Distribution		*3,000*	3,4
			Clerical Assistance		*1,800*	1,7
				Grand Total Kr....	*37,500*	30,7

Rules concerning publications adopted at the Paris Meeting, 1933, seem to work satisfactorily although it is still very difficult to get the annual reports in by the date fixed, March the 1st, inasmuch as one or two reports only arrive on or immediately after this date; — as regards lists of hydrographical data some of these are delivered so late that it is hardly possible to publish the Bulletin Hydrographique before the end of the year, or about one year after the taking of the last observation recorded. Also in respect of statistical data on fisheries a few countries send those so late that it is impossible to have the manuscript ready prior to the annual meeting.

B. Hydrographical Department.

The usual work of reporting meetings has been carried out as in previous years. The routine work has been carried out by mutual assistance of the administrative and the hydrographical staff and concerns the issue of the Bulletin and separate lists of observations and of redrawing and duplicating thermograms mainly.

The thermogram service on Norwegian liners has been extended to include, in addition to the Icelandic routes, the two routes Stavanger-Newcastle and Stavanger-Rotterdam and redrawn thermograms are now being prepared for the four routes.

The Bulletin Hydrographique has been published and contains some 45,000 observations as against 41,000 last year.

In the course of the year the Service Hydrographique has continued the enumeration of data recorded in the Bulletin Hydrographique, the Rapport Atlantique and other publications between altitudes of 45° and 70° N. and from the longit 0° to 20° W. The number of observations n since 1902 up to 1933 (incl.) has been recorded a map for each square of 1° Lat. and Long. in o to get a survey of the material for the considera of the Hydrographical Committee as to what a may in future be specially treated. A similar su map is being prepared for the North Sea in respec sub-surface material i. e. Hydrographical stati The work in the Faroe-Shetland Channel and ne bouring waters recorded in last year's report been continued.

Samples of sea-water have been received from Department of Lands and Fisheries, Dublin, and f Belgium for control titration under supervisio the Hydrographer who has also been in cons touch with various institutions and experts hydrographical matters. The Hydrographer has engaged on correspondence with members of Sub-Committee for the consideration of no clatures and a preliminary report is expected t submitted at the coming meeting.

C. Statistical Department.

The Bulletin Statistique for the year 1932 published in December 1934; the late appear was due mainly to the complete re-arrangemen the tables in accordance with a programme ado at the last meeting of the Statistical Commi The work on the Bulletin for the year 1933 is we hand, but statistical data are still missing fro few countries.

Rules Concerning Publications.

Fully prepared and final manuscripts only should elivered for publication. They shall be type- en on one side of the paper only and sent, prefer- in two clear copies, directly to the Admini- ve Secretary.

Manuscripts written in the author's language be read at the Central Office and finally pre- for setting up by printers. Manuscripts written language foreign to the author shall be corrected and/or translated at the Central and returned to the author for approval before to press.

A first proof shall be corrected in accordance the Manuscript at the Central Office and sent e author for approval. Author's corrections, not utely necessary, shall be avoided in order to expenses.

w and separate paragraphs may be inserted the insertion of new words or sentences into agraph, already set up, is not allowed. Additional at the end of a paragraph are permitted.

A second proof shall be sent to authors on al request only. Authors' corrections, not in dance with the original manuscript, are not ed at the Council's expense, while independent paragraphs will be permitted.

Manuscripts shall be returned to the author proofs when 2 copies are delivered only as they he only legal proof possessed by the Council in dispute with printers. When exceptions are e in special cases the single manuscript must eturned to the Central Office.

ıe Administrative Secretary is responsible for fs sent to authors being absolutely in accordance the manuscript.

Drawings and diagrams for reproduction should prepared in water-proof Indian ink (Encre de e) on white paper or card. Shading should be ed to the minimum necessary. Lettering should be inserted in pencil: the block-maker will be responsible for the definitive lettering. Charts and curves may be drawn on graph-paper ruled in pale blue lines, as these lines do not appear in photographic reproduction. Legends for figures should be type-written on a separate sheet.

7) All authors of articles or reports are entitled to 50 free offprints of their paper. Requests for further copies, at their own expense, shall be sent to the Administrative Secretary with the return of the first proof.

8) Notification of proposed publication of Area Reports or Special Reports must be sent to the Administrative Secretary not later than 6 weeks before the Council meeting in order that allowance can be made for the necessary expenditure in the Estimates. Such requests should be accompanied by details as to length etc. if the manuscripts are not delivered with the request.

9) Reports from members of Committees for the Administrative Report must be sent to the Chairman not later than February 1st of each year. The Central Office will remind all members of this during the 1st week of January.

Administrative Reports from Chairmen of Committees must be sent to the Administrative Secretary not later than March 1st of each year. The Central Office will remind all Chairmen of this during the first week of February.

Reports received later than 6 weeks before the date of the Council meeting shall not be accepted for publication.

10) The grants for publication of special reports or papers in any financial year shall cease automatically if manuscripts have not been delivered on March 1st and publication can not take place until grant has been renewed at the next Council Meeting.

Reports of Area Committees.

NORTH-EASTERN AREA

1934.

By

Oscar Sund (Vice-Chairman).

All countries represented on the Committee have been asked to supply information on the work done in 1934 regarding fishery research in the North-Eastern Area, but such information has been obtained from Germany and Norway only while **Denmark, England, Scotland** and **Sweden** have stated that no work has been done by these countries in our area in the year under consideration.

Germany.

As in former years extensive market measurements have been carried out at the port of Wesermünde, viz. of about 19,000 cod and 15,000 haddock. As material for age-determination otoliths are henceforth exclusively to be used. Special regard was taken of the fishery on the coast of Norway which started on a considerable scale in 1934 and Dr. Lundbeck took part in a fishing trip to this area in March—April 1934. A short account by Dr. Lundbeck of the main aspects of the German fishery in this area is given below.

Tätigkeitsbericht für die N.O.-Area für 1934.

(Dr. Lundbeck).

Nachdem im Vorjahre ein Überblick über die bisherigen Ergebnisse der Marktuntersuchungen an der Deutschen Barentssee-Fischerei zusammengestellt wurde, soll in Zukunft in näherem Anschluss an die inzwischen weiter ausgebaute Fangstatistik eine Zusammenfassung der Untersuchungen und Berechnungen nach im Juni endigenden Fangperioden erfolgen (womit eine zeitliche Übereinstimmung mit den norwegischen Berichtsperioden erreicht ist). Zahlenangaben fallen demnach in diesem Bericht aus. Der für Fischereikreise bestimmte Bericht für 1933/34 ist veröffentlicht (Schriftenverzeichnis Nr. 2).

Die Arbeiten sind in der bisherigen Weise weitergeführt worden; der Umfang der Messungen ist (eingeklammert: Vorjahr):

Kabeljau.....	19,083	(12,706)	Stück
Schellfisch.....	14,937	(10,736)	—
Andere.....	418	(1,012)	—
zusammen...	34,438	(24,454)	Stück

Die Altersuntersuchungen sind inzwischen ständig auf die Verwendung von Otolithen umges worden. Neu hinzu kam die Untersuchung erstmalig in grösserem Umfange im Frühjahr ausgeführten Fischerei an der norwegischen Ki wohin auch die einzige Seereise (mit dem Wesermü Fischdampfer "Mosel" vom 21.3. bis 28.4. 1 führte.

Die deutsche Fischerei in der N.O.-Area hat g das Vorjahr erfreulicherweise zugenommen, allerdings an das beste Jahr 1930/31 heranzureic Auch für die Barentssee selbst ergibt sich eine St rung. Vgl. die Zahlen in Schrift Nr. 2!

Die Erträge an Schellfisch haben 1933/34 eine bedenkliche Abnahme erfahren, die sich in neuen Periode 1934/35 verschärft hat. Die Urs wird darin erblickt, dass die der Laichreife entge gehenden alten Schellfische in starkem Masse abgew dert sind. Die Prüfung der Längenzusammensetz der Schellfischfänge bestätigt das.

Der Kabeljau ergibt steigende Ausbeuten, wie die bisherigen Beobachtungen schon voraussel liessen. Es wird dabei immer deutlicher, dass zugle Veränderungen eingetreten sind, die sich nicht Veränderungen der Fischbestände erklären lass Offenbar sind hydrographische Einflüsse dafür ursä lich, wenn der Kabeljau auf den Bänken (Spitzberg und Kanin-Bank) nicht in dem Masse gefangen wer kann, wie es zu erwarten wäre, vielmehr im tiefe Wasser am Rande der Bänke und mehr im Bereich warmen Strömungen (Nördliche Skolpenbank, Geb des Nordtiefs östlich der Skolpenbank, Gänseba in grösster Menge gefangen wurde, ein Vorgang, ebenfalls in der Fangperiode 1934/35 noch stär hervorgetreten ist. Bedauerlicherweise ist es unm lich, mit den bisherigen und bislang erfolgreic Methoden der Bestandes-Kontrolle diese neue Fr zu lösen.

Norway.

The Norwegian institutions which have undertak fishery or oceanographical research work in the A in 1934 were, in addition to the Directorate of Fisher the Tromsø Museum and the Geophysical Institu Bergen. As the work done by these two institut

in the main oceanographical, reports on it and he oceanographical work of the Directorate of eries have been presented to the Hydrographical mittee and it does not need to be further ioned here.

Fisheries Directorate.

Oceanographical work and plankton investigns were carried out by means of the two vessels e Directorate, the "Johan Hjort" and the "Virgo" by means of the "Armauer Hansen" which was l from the Geophysical Institute for shorter ods.

Biological Investigations. At the biological ion in Trondheim Mr. G. ROLLEFSEN arranged a s of experiments on the development of different ish, including a number of artificial hybrids. Some hese are thought to be of interest as providing a ible check on the effect of artificial sea fish hing, since the resulting young fish will be y distinguishable from the fry produced by natural cies, *in casu* fry of *Pleuronectes platessa*. work on the biology of this fish will be extended 935, a. o. through extensive investigation on occurrence of the young fish. A beginning only his was made in August—September 1934.

he biostatistical work on this fish was continued mainly the same lines as previously, about 107 usand spawning fish being measured as well as thousand fish at Finmark in May—June. Four usand otolith samples were collected for Mr. LLEFSEN's studies on the age and sexual develop- t (number of spawnings).

he coastal races of cod have been studied by ns of vertebral countings, and this investigation be continued on fish of all sizes.

ring.

he usual programme of sampling the commercial hes was carried through, involving the examination 6 samples of large and spring herring (maturing and ure resp.) and 22 samples of small and fat herring ung and adolescent), each sample consisting of individuals. Of each fish three scales were mounted the age determined, for a great portion of the terial the number of vertebrae was also established. n extensive search was made to determine the its of the spawning area of the herring, not only the well known spawning grounds on the south- t coast, but also in order to locate, by means the bottom grab, the still unknown spawning ces on or to the north of the Arctic Circle. The stence of these northern spawning grounds is mised from the occurrence of spawny cod in many ces and from the small size of pelagic herring fry nd along the northern and also the Finmark sts in summer. These efforts have so far been successful in the north but are to be continued in spring of 1935.

The spawning of the spring herring was investigated during cruises with the "Johan Hjort" and the "Armauer Hansen" (hired from the Geophysical Institute) from January 25th to April 15th, including 541 stations worked by means of the Petersen grab.

At the Biological Station of the Bergen Museum, Herdla, experiments were made on the rearing of herring eggs in different temperatures.

Sprat.

Regular sampling in all fishery districts was continued as formerly, involving the collection and examination of 106 samples from the commercial (seine) catches.

Sprat investigations. (PAUL BJERKAN).

The sampling of commercial sprat for biostatistical investigation has been continued on the same lines as during previous years. 105 samples have been collected from the sprat fishery off the west coast. Of these 7 samples consisted of young fish of the brood of the year 1934. The commercial sprat consisted almost exclusively of the year-class 1933, only in early spring were samples of older sprat found.

Vertebral counting was undertaken for some of the young fish samples, showing average vertebral numbers from 47.8 to 48.0, increasing with the size of the young fish, which were very uneven from sample to sample.

Cruises were undertaken in the sprat districts during the season with the m/s "Virgo" and "Johan Hjort".

Literature on Research Work in the North-Eastern Area in 1934.

German.

LUNDBECK: Überblick über die Ergebnisse der Marktuntersuchungen an deutschen Fängen aus dem Barentsmeer und von der Bäreninsel in den Jahren 1929 bis 1933. Rapp. et Proc.-Verb., Vol. LXXXVIII, 1934, p. 3.

— Die Fangerträge in der Barentssee, an der Bäreninsel und an der Norwegischen Küste in der Fangzeit 1933—34. Deutsche Fischerei-Rundschau, 1934, p. 588.

— Veränderungen in der Nutzung des Arktisch-Norwegischen Kabeljaubestandes durch die neue Trawlfischerei an der Norwegischen Küste. Rapp. et Proc.-Verb. Vol. LXXXIX, 3e partie 1934, I.

— Fischereibiologisches über die neue Dampferfischerei an der norwegischen Küste. Der Fischmarkt. 1934, p. 200.

Norwegian.

GUNNAR ROLLEFSEN: The Cod Otolith as a Guide to Race, Sexual Development and Mortality. Rapp. et Proc.-Verb. Vol. LXXXVIII, 1934, II.

PER OTTESTAD: Statistical Analysis of the Norwegian Herring Population. Ibidem, III.

JENS EGGVIN: Oceanographic Conditions at certain Norwegian Fishing Grounds. Ibidem, IV.

SVEN RUNNSTRÖM: The Pelagic Distribution of the Herring Larvae in Norwegian Waters. Ibidem, V.

PAUL BJERKAN: Marking Experiments of Plaice (*Pleuronectes platessa*). Ibidem, VI.

Oscar Sund: Cod-Measurements during 21 years on the Western and Northern Coasts of Norway, Methods and Results. Ibidem, VII.
Sven Runnström: Sildeundersökelser 1931—32. Årsberetning vedk. Norges Fiskerier 1932. (1934).
Paul Bjerkan: Brislingundersökelser 1931—32. Ibidem.
— Undersökelser angående fisket med åletrål. Ibidem.
Sven Runnström: Om den norske silds gyteinnsig og raceforhold. Naturen 1934 nr. 5 og 6.
Torbjörn Gaarder og Paul Bjerkan: Östers og Østerskultur i Norge. Fiskeridirektoratet 1934.
Four articles in the "Lofoten Report" (Årsberetning v Norges Fiskerier 1934) on the cod population an oceanographical conditions affecting the fishery.
Oscar Sund: Torskebestanden i 1934.
Gunnar Rollefsen: Skreiens alderssammensætning (composition of the spawning cod).
— Skreiens gytning og eggenes befruktning (Spaw and fertilization of Cod Eggs).
Jens Eggvin: Oceanografiske forhold under Lofotf (Oceanographical conditions affecting the Lof Fishery).

Summary of 1934-cruises.

Germany.

Measurements etc. at Wesermünde of trawlers' catches on return from Barents Sea.

Norway.

M/S "Johan Hjort"; commissioned from Febr. 5th—Sept. 22nd; Norwegian coast: herring: Febr.—Mar. (Runnstrøm); Spawning: Mar.—May (O. Sund); young fish: May—July (Eggvin and Sund); sprat: Sept. (Bjerkan).

M/S "Armauer Hansen"; Jan. 29th—Apr. 1 Norwegian coast: herring (Runnstrøm and Sole

M/S "Sparre Schneider"; beginning of each mo Tromsø coast and fjords: fish fry investigat (Soot-Ryen).

M/S "Virgo"; Norwegian coast: June 5th—A 23rd: sprat (Bjerkan).

Scotland.

S/S "Explorer"; May—July: hydr. conditi between the Shetlands and the Norwegian Deep

NORTH-WESTERN AREA

1934.

By

Å. Vedel Tåning.

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the year 1934 our co-operative work has been ntinued in the Area on the same lines as those wed for some years. The investigations have, rding to programme, dealt especially with the important species in the Area: Cod, Haddock, e, Halibut and Herring. Some of the outstanding ts of the year's investigations in the Area may be emphasized: The "Dana" observed in May rmally high temperatures in the sea to the east eland; herringlarvæ in numbers were found on banks off the Faroes, especially on the Suderø k; the eggs of the halibut were found in deeper r layers between Faroe and Iceland; and during year extensive emigration of cod from Greenland eland has taken place.

e have endeavoured to make our co-operative k as continuous as possible, e. g. by taking fixed ographical sections several times a year, by cting material for age-determinations etc. at fixed ities and at fixed seasons etc. The area is, however, ch an extent that it is difficult with the research els and personel available to keep up continuity year to year.

e work mentioned below has been carried out he various participating countries.

Denmark.

he Danish research vessel "Dana" made a cruise he spring and early summer to the Faroes and and and drafted a hydrographical section out to deep water between East Iceland and Norway. cruise of 1934 took place between 11th April and July, thirty days, however, were employed work in the North Sea.

fter a call at Aberdeen on April 19th, where a inuous hydrographical section in the Shetland-oe Channel was fixed with Scottish collaborators, "Dana" crossed the Shetland-Faroe Channel, ked on the banks round the Faroes from 22nd il to 6th May and carried out some deep-sea work ween the Faroe Bank and South Iceland, where eggs of the halibut were found. After working trawl, tow-nets, bottom sampler etc. at the west-, h- and east coast of Iceland until 25th May, a hydrographical section was made from East Iceland out into the Norwegian Sea and towings were carried out again on the banks round the Faroes. After further work in the North Sea, the "Dana" returned again to the Faroes in order to continue work there between 1st and 11th July. When the Shetland-Faroe Channel was crossed the fixed hydrographical section was taken. Plankton investigations were carried out at the Faroes and Iceland by Dr. E. Steeman Nielsen; hydrographical investigations in all areas by Helge Thomsen, M.A. Echo soundings were taken wherever deep water was crossed, especially to the east of Iceland. In the Shetland-Faroe Channel an echo sounding section along the line fixed for the continuous hydrographical section already mentioned was made on August 21st by H.M.S. "Hvidbjørnen".

Faroes.

As mentioned before the banks round the Faroes were visited three times during the spring and early summer, in April, May and July, with the object of carrying out a thorough investigation of the distribution of larvæ of the spring spawning herring. A maximum in distribution was found on the Suderø Bank east of the islands, where 180—220 specimens per 15 minutes haul with 2 meter stramin net could be taken, whereas the number caught was low in most other localities. In April the size of the larvæ was 8—17 mm. and in May 9—23 mm.; in July the post-larval stages could be taken exceptionally only in the stramin net, as they had now attained a size too large for the implement used.

Cod marking had been planned at the Faroes, but the spawning cod were scarce on the banks and left these very early in the season; the marking was therefore postponed. Material of the youngest year-classes of cod, green-cod, plaice etc. was collected as usual in the fjords. Hydrographical sections and plankton collections were carried out and drift bottles liberated.

Collection of cod material from commercial catches for investigation of fluctuations among the stock has been continued, about 15,500 measurements and 1400 samples of otoliths having been procured.

The eggs of the halibut were taken in deeper water layers between Faroe Bank and Iceland; a special report will be published in 1936.

Iceland.

During the cruise of the "Dana" in May investigations were carried out at the west-, south- and east coast of Iceland. The distribution of eggs and larvæ of cod and of larvæ of the spring spawning herring was the principal object of the pelagic investigations; trawlings were carried out in Faxe Bay and on the south-coast; bottom-sampling was made on the east-coast; drift-bottles were liberated off the southeast- and east coast of Iceland; plankton and hydrographical investigations were made (*vide infra*). The trawlings showed that the good year-class 1931 of haddock still predominates as in 1933; very high catches were taken intra-territorially in Faxe Bay. Off Langanes on the north-east coast some 250 plaice were marked and liberated from the "Dana" 22nd May; of these 100 specimens were liberated about 60 nautical miles off the coast in water of depths ranging between 825 and 975 metres, where the bottom temperature was below 0°; in July, September and October three of these plaice have been recaptured near the coasts of East-Iceland, which gives interesting information as to plaice-biology. The experiment will be continued.

On all coasts of Iceland the marking experiments on plaice have shown an increasing percentage of recaptures during recent years; see table below.

Percentage of recaptures of plaice at Iceland.

	Year of marking		No. marked	% of recaptur
I. West coast.				
Faxe Bay	*1925—1927*	Intra-territorial waters	596	*18*
		Extra-territorial waters	643	*22*
	1932	Intra-territorial waters	150	*42*
		Extra-territorial waters	150	*53*
II. North coast.				
Skjálfandi Bay[1])	*1924*	Intra-territorial waters	235	*47*
III. East coast.				
Vopnafjord[2])	*1931*	Intra-territorial waters	227	*44*
IV. South coast.				
Ingolfshöfdi	*1927*	Intra-territorial waters	114	*38*
		Extra-territorial waters	135	*39*

[1]) Percentage of recaptures in experiment *1903*, same locality (280 spec. marked) was *5.0* % only.
[2]) Percentage of recaptures in experiment *1905*, same locality (494 spec. marked) was *7.5* % only.

This coincides with a very pronounced fall in catch per 100 hours trawling. During the years 1922 to 1933 we have the following cwt. per 100 hours fishing by English steam trawlers: 56, 50, 42, 48, 44, 42, 30, 30, 39, 30, 26, 20; the catch per 100 hours having thus decreased nearly to that of the North Sea fishery. The increasing intensity of the fishery is obviously too strong for the stock available.

In the spring 1000 spawning cod were marked and liberated off the south-coast (from the Icelandic inspection ship "Þor"). The percentage of recaptures was as in previous experiments approx. 4 during the following 6—7 months; two specimens of this ye marking being recaught at West-Greenland, both days after marking, the one, however, far no (about 67°20′), the other near Cape Farewell (ab 61°). From the marking experiments carried out South-Iceland during 1929—1933 some more specim have been recaptured, some at West-Greenland, even in North Norway. The emigrants appear West-Greenland from 16th July to late Septem

Cod- and other investigations have been contin by "Fiskifélag Íslands" (by Árni Friðriksso M.A.). The following report has been received fr the president of the society, Mr. Kristján Bergss

Measurements of cod with collection of otol for age-determinations have been maintained in following localities:

1. Hornafjord ...	741 measurements	123	otol
2. Westmanna Is.	2280 —	383	—
3. Grindavík	696 —	200	—
4. Keflavík.....	4325 —	398	—
5. Reykjavík....	755 —	190	—
6. Siglufjord	1228 —	201	—
7. Offshore banks (from steam trawlers)	1083 —	147	—
Total:	11,180 measurements	1648	otoli

The average size of cod was larger than the preced year owing to the fact that no new year-class was any degree added to the present stock of year-clas The outstanding dominants were the 1922 and 1 year-classes (12 and 10 years old); the forme evidently decreasing, while the 1924 year-class sh a maximum in the catches. Off Hornafjord old y classes were outstanding in the catches; especi the year-classes 1917 and 1919, which, in ot localities, have been decreasing.

Of herring about 8000 specimens were measu mainly off the north-coast in the months of July August. A considerable material for age-determi tions was collected. Furthermore about 1400 stoma

ings were analyzed, most of them in the summer
s off the north-coast. A quantitative invest-
n of the content of the stomachs has been
ued with success as in previous years (see
t Fiskifélag Íslands, 1934, I. Fiskirannsóknir
In 1934 the quantitative distribution and drift
plankton also proved to be of outstanding
tance to the herring fishery. Investigations of
urnal vertical migration of the macro-plankton
been carried out off the north-coast of Iceland
summer months. Moreover experiments have
made with the Hardy plankton indicator, both
ssels with "snurpenot" off the north-coast and
xe Bay by vessels with drift-nets. Both experi-
have given positive results pointing to a
cal use of the implement in question also off
d.

psea thermometers as used by Norwegian
men in Lofoten were procured to see whether a
ble optimal temperature on the fishing banks was
lated with maximal catches.

ne hundred surface temperature observations
been made by a number of vessels in collabora-
with the "Vedurstofen" in Reykjavík (Me-
logical Institute).

ese investigations have for the greater part been
ed out in the laboratory and will in a short time
ublished ("Ársrit Fiskifélag Íslands, 1935, I.
rannsóknir IV").

mark Strait.

e cruise of the "Dana" was too early in the year
nvestigations concerning the drift of cod larvæ
Iceland to East-Greenland. As, however, it was
desirable, in 1934 also, to have investigations
the Denmark Strait as to this drift of cod larvæ,
s arranged by courtesy of the Danish Admiralty
H.M.S. "Hvidbjørnen" in the days 7th to 10th
ly to fish for fish larvæ with 2 metres stramin
between northwest-Iceland and Angmagssalik on
ast coast of Greenland. According to the material
8 pelagic stations carried out along the line,
e many cod larvæ were taken by the "Dana"
931 and 1932, no or very little drift of cod larvæ
place in 1934 (the same was the case in 1933 —
hat year's report, Rapp. et Proc.-Verb. LXXXIX,
p. 19). The material showed that the fishing of
vessel had been successful, several postlarval
es of the halibut having been caught.
nese investigations will be continued.

enland.

ast-Greenland: No investigations in 1934, but
ral publications issued from the expeditions in
—34.

est-Greenland: Professor Ad. S. Jensen,
ry adviser to the "Grønlands Styrelse" has given
following survey of the work carried out in the
stal waters of West-Greenland during 1934.
area of investigations in 1934 comprises the
rs from Holstensborg colony (about 66°55′ Lat. North) to the sounds at Cape Farewell (about 60° Lat. North). The investigations have been made by Mr. Paul Hansen from April 22nd to October 1st from the motorboat "Umarissok" of the "Grønlands Styrelse".

The life history of the cod has especially been subject to investigations. The eggs and larvæ have been fished for by 1 meter stramin net, the year-groups I—II and partly the III-group have been fished for by eel hand seine. A great number of cod from commercial catches has been measured and otoliths collected for age-determinations. Moreover the "Grønlands Styrelse" has arranged that collection of otoliths and measurements of about 7000—8000 cod has been carried out by officials several times during the season in most of the principal fishing localities both in the southern and northern part of West-Greenland. At various places a total of 750 cod has been marked and liberated from the motorboat.

In the Sukkertoppen and Julianehaab districts a great number of herring has been measured and samples of scales and otoliths have been taken. Hydrographical observations from the surface to a depth of 300 metres have been carried out at various stations.

On the offshore banks H.M.S. "Ingolf" has collected some measurements of cod, and Skipper Alfr. Egholm of the Faroe cutter "Suðeroy" has marked and liberated about 200 cod and procured about 2200 measurements and 350 otoliths of cod which provide most valuable material.

In 1934 the marking experiments of cod in Greenland waters have given interesting results, most of the recaptures being recorded from Icelandic waters. A paper on the marking experiments during the period 1924—1933 has been issued (see list of literature).

Whales.

Statistics have been collected at Greenland and at the Faroes. At Greenland the Danish whale boat "Sonja" in 1934 caught 23 fin whales, 2 blue whales and 2 humpbacks. At the Faroes Lopra Whaling Station (2 whale boats) in 1934 caught 74 fin whales, 13 sei whales, 2 blue whales and 7 sperm whales.

Racial investigations.

A sample of 195 big cod taken at the spawning time on Selvogsbanki, South Iceland, has been received from Dr. Bjarni Sæmundsson, Reykjavík. The average number of vertebræ was 53.148 and the average number of rays in D_2 19.859, which are rather high values for the area. The material collected over a period of years as a supplement to the late professor Johs. Schmidt's material published in 1930 will now be published.

Other investigations.

Data concerning all material of *Anguilla*-larvæ collected in the Atlantic by the late professor Johs. Schmidt have been prepared for publication.

Plankton investigations. (Professor Ove Paulsen).

During the cruise of the "Dana" collections were carried out in the area by Dr. E. Steemann Nielsen. The material has been collected to give a survey of the macroplankton fauna in Icelandic waters and to procure material for an investigation of the production of phytoplankton in the North Atlantic. A comprehensive publication on the later subject is under preparation (see further report of the Plankton Committee).

Hydrography. (See Report of the Hydrographical Committee on page 63).

England.

No work in 1934.

France.

No work in 1934.

Germany.

In August Dr. Meschkat went on a fishing steamer to Iceland and procured a series of quantitative surface catches of plankton in order to study the diurnal variations and stomach contents of the still plankton-eating young whiting (*Gadus merlangus*). The proposed spring voyage of 1934 to the Icelandic fishing area (see report 1933—34) was abandoned but is to take place in February and March 1935.

E. Hentschel.

Norway.

Surface observations were obtained by means of thermographs on the two Bergen—Iceland lines, one fortnightly ("Lyra") and one monthly ("Nova"). The diagrams are reduced and copied by the Bureau and distributed to members on request.

No other work at sea has been done by Norway in the North-Western Area in 1934, but observations made during the three expeditions, in 1931, 1932 and 1933, conducted by Thor Iversen on behalf of the Norwegian Fisheries Directorate (ships: "Veiding", "Polaris" and "Heimland I") are now being worked out. Of more general interest are the extensive echo-soundings made in 1933 by means of Marconi gear (limit of range 720 fathoms). In East-Greenland waters and the Denmark Strait the aggregate length of the sounding track was 4200 miles. Furthermore soundings were made continuously on those parts of the voyage between Hasselfjord (Vesteraalen, North Norway) and North Iceland, North Iceland—Jan Mayen and from here to Aalesund, where depths were found less than the maximum range mentioned. These sounding results are entered on contoured charts to be published in the near future.

Work contemplated in *1935*: Surface observations as hitherto. One of the ships ("Nova") will shortly have its thermograph exchanged for the Negretti-Zambra instrument in order to have only one type of thermographs in the services run by the Fishe Directorate. Oscar Sun

Scotland.

The Scottish research vessel carried out no w in the area during 1934. Material from the Faroe adult herring for racial investigations has been wor out by Mr. Henry Wood, who has given a sur of the results obtained; this report is included h

Three samples of herring were obtained fr the Faroes. This material, which was caught April 1934, had of necessity to be preserved formalin, which normally involves some small adj ments in measurements, and which adds some d culty to the preparation of the scales for age de minations. Nevertheless a fairly good series of latter was obtained. The measurements of the samp were as follows:— (See Table 1.)

The first two samples consisted exclusively immature herring, while 93 per cent. of the third w maturing adult spring spawners. (See Table 2.)

Notable differences are apparent both in the s distribution and age composition of herring fr Skaalefjord and Sundene, the dominant group in former area having 3 winter rings, and in the lat 2 winter rings.

Race analysis was made in all cases, the counts the vertebrae and keeled scales (K_2) being as follo (The less immature herring in the sample from Kol fjord are omitted). (See Table 3.)

The samples of immature herring do not show a significant difference in the numbers of their vertebr and K_2 from those of the adult spring spawners Sample 3. Obviously all of them belong to spri spawning stock, characterised by a high number vertebrae and a low number of K_2. At the same ti the small differences in vertebrae and K_2 in t immature groups were associated with size differenc as seen by the measurements of the component a classes. (See Table 4.)

In both cases it will be seen that the herring Skaalefjord (S.E. coast) are larger than the corr sponding groups from Sundene (N.W. coast). The ring group from Skaalefjord would appear to have bimodal size distribution, — the lower mode corr sponding with the mode of the Sundene grou Comparison between the sizes of the 2 ring group the respective areas suggests that the herring of t S.E. coast had a higher growth rate than those the N.W. coast, and it is probable that the 3 ri group from Skaalefjord represents a mixture of t two growth types.

The samples are small and, without local knowled of conditions in the area, one hesitates to stre differences which may be more apparent than rea

The ages of the spawners from Kollefjord ran from 4 to 12 years, but only the year-class 1929, whi formed 60 % of the total sample, was outstandin

Henry Wood.

Faroe Herring (cf. text p. 14).

1.

Size Distribution.

cm. Length

of Capture	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	Totals
efjord...	—	—	3	6	30	45	29	30	19	11	1										174
ne	1	5	8	20	25	19	10														88
jord....	—	—	—	—	1	—	1	1	1	3	1	2	16	33	31	8	8	5	1	1	113

2.

Age Composition.

Percentages.

of Capture	2	3	4	5	6	7	8	9	10	11	12 Winter Rings
efjord...	29.9	68.4	1.7	—	—	—	—	—	—	—	—
ne	56.9	43.1	—	—	—	—	—	—	—	—	—
fjord....	.9	4.5	8.8	*60.1*	11.5	—	.9	5.3	4.4	1.8	1.8

e 3.

1. Skaalefjord.

Rings	Vertebrae						K_2						
	56	57	58	59	Totals	Means	12	13	14	15	16	Totals	Means
.....	5	39	8	—	52	57.058	—	15	26	9	—	50	13.880
.....	12	85	19	2	118	57.085	1	38	59	14	1	113	13.789
.....	—	1	2	—	3	—	—	—	2	1	—	3	
	17	125	29	2	173	57.092	1	53	87	24	1	166	13.825

2. Sundene.

Rings	Vertebrae						K_2						
	56	57	58	59	Totals	Means	12	13	14	15	16	Totals	Means
.....	4	32	12	—	48	57.167	2	13	26	8	—	49	13.816
.....	4	25	7	2	38	57.184	3	10	22	2	—	37	13.621
	8	57	19	2	86	57.174	5	23	48	10	—	86	13.732

3. Kollefjord. (Maturing Herring only).

Rings	Vertebrae					K_2					
	56	57	58	Totals	Means	13	14	15	16	Totals	Means
.....	3	5	2	10	56.900	3	4	2	—	9	13.889
.....	8	44	15	67	57.141	19	34	13	1	67	13.940
-12.....	4	21	2	27	56.926	6	15	4	—	25	13.920
	15	70	19	104	57.038	28	53	19	1	102	13.921

le 4.

Size Distribution of 2 Ringers (Year-Class, Spring 1932).

Area	17	18	19	20	21	22	23	24	25	26	Total	Means
lefjord....	—	—	3	6	21	12	5	4	1	—	52	21.500
lene	1	5	6	16	15	6	1	—	—	—	50	20.220

Size Distribution of 3 Ringers (Year-Class, Spring 1931).

Area	19	20	21	22	23	24	25	26	Total	Means
alefjord....	—	—	9	33	24	26	18	9	119	23.319
dene	2	4	10	13	9	—	—	—	38	21.605

Literature.

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Å. VEDEL TÅNING: Survey of Long Distance Migra of Cod in the North Western Atlantic accordin Marking Experiments. Rapp. et Proc.-Verb., LXXXIX, III, 2, p. 5—11. 1934.

— A supposed submarine ridge along the south-east c of Greenland. "Nature", Vol. 133, p. 326, 1934.

Furthermore several systematic contributions to marine flora and fauna of East-Greenland have published in "Meddelelser om Grønland" Bd. 100 104 (from "The Three years expedition to Christian den Land 1931—34" and from "The Scoresby Sound Com tees 2nd East Greenland Expedition in 1932 to Christian IX's Land").

In the work "Zoology of the Faroes" survey marine animals, the hydrography etc. have been publis

Summary of 1934-cruises.

Denmark.

S/S "Dana"; Dr. TÅNING; Faroese waters: Apr. 22nd—May 6th, May 25th—31st, July 1st—11th; Icelandic waters: May 6th—25th: net towings, trawling, bottom sampling, marking of fish (Faroes: 14 cod; Iceland: 1012 cod, 258 plaice, 53 catfish, 24 haddock).

S/S "Þorr"; Capt. E. KRISTOFERSSON; S.W. Iceland: Mar. 24th—31st and Apr. 10th—16th: marking of cod (1000 spec.).

H.M.S. "Hvidbjørnen"; Capt. K. v. Lowzow, R. N.; S. coast of Iceland: June: measurements and collecting otoliths of plaice. July 7th—10th: Denmark Straits: pelagic towing.

H.M.S. "Ingolf"; Capt. C. V. EVERS, R.N.; J 28th—29th: W. coast of Greenland: cod-meas ments.

M/B "Suðeroy"; Skipper ALFR. EGHOLM; W. c Greenland: measurements and otoliths of cod. spec. marked.

M/B "Umarissok"; Mr. PAUL HANSEN; sum months: W. coast Greenland: usual fishery inv igations, 750 spec. of cod marked.

France.

S/S "Pourquoi Pas"; Comm. CHARCOT; Jun Sept.: Iceland and E. coast of Greenland: hyd graphy only.

S/S "Ville d'Ys"; May—Nov.: Newfoundlan Greenland: hydrography only.

PLATEAU CONTINENTAL ATLANTIQUE

1934.

(Atlantic Slope).

Par

Ed. le Danois.

1934	Grande-Bretagne	Irlande	France	Espagne	Portugal
er.....	Salpa	....	....	....	Albacora
er.....	Salpa	Muirchu	....	Xauen	Albacora
.....	Salpa	....	....	....	....
.....	Salpa	....	....	....	....
.....	Salpa	Muirchu	Président Th. Tissier	....	Albacora
.....	Salpa	Muirchu	Président Th. Tissier	....	....
et.....	Salpa	....	Président Th. Tissier Pourquoi Pas	Xauen	....
.....	Salpa Chalutiers de Cardiff	Muirchu	Pourquoi Pas	....	Albacora
embre	Salpa Chalutiers de Cardiff	....	Président Th. Tissier	....	Albacora
bre.....	Salpa Chalutiers de Cardiff	....	Président Th. Tissier	....	....
embre.....	Salpa	Muirchu	Président Th. Tissier	....	Albacora
embre.....	Salpa	....	....	....	....

Les recherches effectuées dans la zone d'études du Comité peuvent être résumées de la façon suivante:

Espagne: Le navire "Xauen" a pu faire pendant les mois de Février et de Juillet, deux croisières dans la région de Gibraltar et de la baie d'Espagne.

France: Le navire "Président Théodore Tissier" a effectué deux croisières en 1934: l'une en Mai-Juin-Juillet au nord des côtes de France, en Mer du Nord et autour des Iles Britanniques; l'autre en Septembre-Octobre-Novembre en traversant l'Atlantique pour effectuer des recherches sur les bancs de Terre-Neuve et leurs eaux limitrophes.

Le navire "Pourquoi Pas", ayant à son bord le Commandant Charcot comme Chef de mission, a travaillé entre la France et le Groenland pendant les mois de Juillet et Août, mais les stations océanographiques se trouvent placées hors de la zone d'études du Comité.

Grande Bretagne: Le navire H.M.S. "Salpa" de la Marine Biological Association, a effectué régulièrement des sorties mensuelles aux stations prévues par le programme du Comité du Plateau Continental Atlantique.

De plus, d'Août à Octobre, deux chalutiers de Cardiff ont expérimenté divers filets afin de se rendre compte de l'influence des différents maillages sur le produit de la pêche.

Irlande: Le navire "Muirchu" a effectué en Février, Mai, Juin, Août et Novembre des croisières périodiques portant sur l'hydrographie et l'étude du plancton, tantôt sur la côte nord et tantôt sur la côte sud de l'Irlande.

Portugal: L'"Albacora", en Janvier, Février, Mai, Août, Septembre et Novembre, a accompli de nombreuses sorties au point de vue hydrologique au large de la côte portugaise. De plus, au mois de Septembre, deux stations de 24 heures ont été effectuées par ce navire, mouillé dans le détroit de Gibraltar, en vue de l'étude des courants profonds.

ANNEXE I.

Comité Atlantique.

J'ai l'honneur de vous rendre compte que, comme suite à la mission qui m'avait été confiée par le Conseil International pour l'Exploration de la Mer, j'ai transmis aux Membres du Conseil International des Pêcheries de l'Amérique du Nord, les premiers documents concernant l'étude des classes de poissons comestibles (hareng, morue, églefin) qui m'avaient été signalées comme ayant été les plus abondantes dans les mers européennes. Ces données ont été étudiées par nos Collègues Américains qui ont constaté d'importantes analogies dans le développement spécial de certaines classes de poissons des deux côtés de l'Atlant
Le Comité des Pêcheries Américaines a décidé
cette étude importante doit faire l'objet de reche
combinées entre les deux Conseils, et, à cet effet,
prévu que M. le Président H. B. Bigelow e
Secrétaire Général, M. A. G. Huntsman viend
assister à la prochaine réunion du Conseil I
national en Mai 1935 afin d'établir un progra
de travail. Ed. le Dano

ANNEXE II.

Note concernant les Croisières du Navir "Président Théodore Tissier".

En 1934, le navire "Président Theodore Tissie
accompli deux croisières.

De Mai à Juillet, ce bâtiment, après diverses ob
vations dans la région située au sud de l'Irla
concernant la pêche du maquereau, a travers
Manche et la Mer du Nord; il séjourna à Copenh
pendant la durée de la réunion du Conseil Inte
tional; il traversa la partie septentrionale d
Mer du Nord, contourna l'Ecosse et travailla au
de l'Irlande, puis, à l'ouest, sur le banc du Porcup
Il revint en France en suivant continuellemen
bord du Plateau Continental dans la région situ
l'ouest de l'entrée de la Manche.

Cette croisière permit d'effectuer des études fi
par le programme du Comité du Plateau Contine
Atlantique concernant les fonds harenguiers
Smalls, des Fladen et d'Inishtrahull.

D'autre part, le "Président Théodore Tissier"
livra à d'importantes études cartographiques, not
ment sur le banc du Porcupine et sur le bord
Plateau Continental, au large de l'entrée occiden
de la Manche, et eut l'occasion, dans cette dern
région, de découvrir un nouveau haut-fond au
fut donné le nom du navire.

En Septembre-Octobre-Novembre, le "Présid
Théodore Tissier" traversa l'Atlantique en suiv
le 45° Lat. Nord, opérant ainsi une section hy
logique à travers l'Océan, du 12° au 62° de longit
Ayant escalé Halifax, la réunion du Conseil In
national des Pêcheries de l'Amérique du Nord
tenue à bord, sous la présidence du Professeur H
Bigelow. De très nombreuses opérations au p
de vue hydrologique, cartographique et biolog
ont pris place sur toute l'étendue des Bancs de Te
Neuve et à l'estuaire du St-Laurent. Parti de Sa
Jean, le navire fit escale aux Açores et rentra à Lor
ayant, à nouveau, pendant sa seconde traversée
l'Atlantique, effectué sur tout le parcours des op
tions hydrologiques et de nombreuses récoltes
plancton.

COMBINED NORTH SEA AND EASTERN CHANNEL COMMITTEE

1934.

By

G. Gilson.

ıe practical difficulties encountered by the scheme or a combined survey of the boundary region een the Channel and the North Sea have been ted out in previous Reports. Considering that ern methods require, more than ever, precise , long series of observations, simultaneousness of ations, great numbers of samples, a rapid working of data and charting of results, the continuance eparate preliminary work appears to be still a ssity for some time to come.

fact, a multitude of biological and hydrological rvations and enormous quantities of material are cted in the region every year by the bordering tries. Though these laborious efforts are still ordinated, and thus leave certain areas and ain periods wholly unexplored, they are very ul in preparing the way for the setting up of a ite plan for a combined international survey.

n the other hand, the introduction of new inven- s and new methods of technique is apt greatly nhance and accelerate both the preliminary mpts and the carrying out of a plan of simul- ous cruises in the intermediate Channel—North region which, undoubtedly, is one of the most resting areas and, perhaps, the most intricate of seas.

mong the latest technical improvements may be tioned:

he introduction of Prof. Hardy's plankton ndicator;

he generalised use of echo-sounding apparatus;

he setting up of Dr. Carruthers' current indicator n fixed stations;

he possibility of immediate titration of sea water samples on board ships by physical and chemical methods;

he use of precise surface thermographs on liners;

he printing of a special chart of the intermediate region with a number of vertical sections by the "Musée royal d'Histoire naturelle" of Brussels, Draft copies of which will be at the disposal of workers for the plotting of results.

An account of the work carried out in the Channel— rth Sea region by the several countries is included the reports of the separate regional committees, of ich we mention only those that have a direct ation to the study of the boundary region:

Belgium.

Continuation of the work of previous years.

Hydrographical work. — Periodical cruises — at least monthly — of the fishery surveying ship "Zinnia". Hydrographical sections across the Straits, between Deal and Gravelines, with Stations B 13, B 14, B 15, B 16, and B 22, in view of future combined survey. — Routine observations on lightship "West Hinder": weekly samples of surface and bottom water. Surface temperature records by a new thermograph giving the tenth of a degree, weekly, on S.S. "Saphir" of the Ostend—Tilbury line. Special research on water circulation in and about Ostend harbour, with particular attention to oil discharge from ships,

Biological work. — Plankton observations with Hardy's plankton indicator and other instruments, on the section Deal—Gravelines and on the line Ostend—Tilbury. Vertical hauls weekly on lightship "West Hinder". Bottom planktonic and semi benthic fauna, with special bottom net. Fish larvae, young stages and biology of shrimps. — Trawling and dredging with S.S. "Victoire". Measurement and age classification of fishes. —

Herring work. — Continuation of study of fishery and biology of the coastal community of spent herring and of sprat, — both researches being among those requiring a systematic survey of the southernmost region. Addition of a fifth year diagram of the biological scale of spent herring. Enormous preponderance of the class 1929 in last year's concentration confirmed this season — 1934 — by scale examination. — Starting of biological scale for sprat. — Structure and physiology of air bladder of herring and sprat. Food of fishes, in connection with composition of plankton and bottom fauna. — Complete examination of 503 herrings from the "Smalls" region, out of 65 landings at Ostend in 1934 (534,150 kg.) — Seasonal hydrographical survey of the region south of the entrance of the Irish Sea is urgently needed for methodical fishing in the area between Cornwall and Ireland.

England.

No change of importance in the work of last year in the boundary region. Summary included in the Report of the Southern North Sea Committee.

France.

Continuation of work in the boundary region as in preceding years. Herring work, especially from the entrance of the Channel to the mouth of the Seine. — Uninterrupted observations on the lightship "Sandettie" and on the liners from Dunkirk to Folkestone. Summary: see Southern North Sea Committee.

Germany.

Work having a direct bearing on the organisation of a future combined survey was carried out in the boundary region during a cruise of the German fishery patrol vessel "Elbe", in late November and early December, 1934. Investigations in the southern area of the North Sea and the eastern area of the Channel regarding the frequency and distribution of fish fry, — especially herring larvae —, on macroplankton, phytoplankton and hydrographical conditions of the surface layers. Herring larvae were met with in even larger numbers than in the preceding year, — about 1000 to the square metre —, at the southern end of the Southern Deep Water, extending eastwards towards the North Hinder region. The larvae, partly with remains of the yolk sack, averaged 9 to 10 mm. in length. In all other parts of the a investigated, herring larvae were absent or v scanty and the spawning of plaice and *Gadus lus* was at an incipient stage.

Holland.

Continuance of research on race and age of dr net herring in the Flemish Bight and in the east Channel, from the end of September 1934 to i end of January 1935. — Owing to the unusua long duration of the herring fishery, and to its be continued in the Channel, a huge material, lar than ever before, was obtained (nearly 3000 ind. Samples were received from Ymuiden each week.[1] was to be anticipated, from concording investigati of last year, the abundant year-class 1929, now year old — 4 winter rings — was largely prepondera On the other hand, 3 and 4-year-old fishes, — ye classes 1931 and 1930, — were poorly represent The good year-class 1927, seven year old, was stil evidence, at least in some of the samples receiv

[1]) After the first days of November, import of cu herring was stopped in Holland.

NORTHERN NORTH SEA

1934.

By

Robert S. Clark,
Vice-Chairman.

Within recent years, increased attention has been paid to the varying hydrological and biological conditions in the Northern North Sea and during the year 1934, all the countries represented on the Committee, with the exception of Sweden, participated for longer or shorter periods in a general survey of the area. The North Sea is open to influences from the Atlantic through the northern passages and the water masses are subject to varying complex changes which may alter the composition and distribution of the plankton. The relation between these changes in the surrounding medium and the fluctuations in the fish stocks is occupying an important place in the researches of this Committee. In the report for 1933, reference was made to an abnormally strong Atlantic influx during the summer and autumn months and to unusually high surface temperatures which were associated with a wide westerly distribution of surface water of Baltic origin. Drift bottles liberated in northern waters were recovered from the English and Danish coasts towards the end of the same year. During 1934, however, the main hydrographic features appear to have been an abnormally strong spring influx of Atlantic water, followed by a smaller secondary pulsation in autumn. A general easterly trend of the surface water masses took place, resulting in the banking up of water on the east side of the North Sea. In the latter half of the ye however, there was distinct evidence of a react resulting in a northerly drift along the western s of the North Sea, this being a reversal of the nor conditions.

The varying effects of these changes on the dispe of the larvae of important food fishes are of gr significance. In regard to Haddock, the initial dis bution on the bottom has a far reaching influence the speed of entry into the Trade categories on acco of the different growth rates in certain areas of North Sea. The distribution and density of the lar are being correlated on the one side with the prevai hydrographic conditions and on the other with distribution and strength of the new recruitm From the first appearance as bottom feeders of new brood of 1934 at the end of June in the reg of the Great Fisher Bank and their occurrence moderate numbers in the hauls taken subsequ within the triangle Ling Bank, Great Fisher Bank Skagerak, it is obvious that a considerable dispe of larvae from the deeper water spawning area of Northern North Sea had taken place in a so easterly direction into an area of quick growth r The actual strength of the recruitment, howe

be gauged until the spring months of 1935 the bottom habitat has been completely ed, but, from the paucity in numbers of the es up to date and from the uneven nature of stribution, it is predicted that the survival of ood has not been on a large scale.

regards herring larvae, the Firth of Forth lly receives large numbers which are carried ely by the currents towards this region from ing grounds along the East Coast of Scotland uring the late autumn months of 1934 larvae bsent from the hauls taken within the estuary. nce has been made to this feature in previous Reversal of the surface currents during the later s of the year would affect the dispersal of originating from the autumn spawning grounds the East Coast of Scotland and a relative ty of this year's brood is anticipated in the eastern area of the North Sea. The concentration vae along the more northerly portion of the rn side of the North Sea and the uniformity in izes captured would appear to support this usion. It will be interesting, therefore, as a further igation of this unusual occurrence, to examine omposition of the later metamorphosing and st scaled stages which may occur during the g-summer months of 1935 in the German Bight long the West Coast of Denmark. Baby plaice e brood of the year also showed unusual distri- n along the East Coast of Scotland. From the ination of the inshore areas suitable as nurseries oung plaice, it was found that the northern ties (Moray Firth and N.E. Aberdeenshire) were productive of the 0-group than the bays to the of Aberdeen. The reverse is usually the case the conditions prevailing in 1934 may have ed from the easterly trend of the surface water s already referred to carrying the eggs and e largely outwith the Scottish coastal zone.

m the annual surveys of plankton organisms in cottish area, we are now in a position to define al and abnormal occurrences and during the year r review, exotic forms were exceedingly rare. and Doliolids were not observed to penetrate North Sea, though they were recorded in small bers along the North of Scotland and at the lands.

e abundance and distribution of the more rtant fish stocks and their fluctuations continue rm the major part of the biological researches n the area. The last recruitment of haddock above normal was the year-class 1931. The subsequent ds of 1932, 1933 and (possibly) 1934 have been to moderate. As the haddock investigations have blished that there is a progressive and rapid ne in the commercial yield of a brood after its year of life, the immediate prospects for the ock fishery in the North Sea are none too ising. As regards the herring population, the stigations have shown an increase during the last years in the autumn spawning component. From the presence in north-western waters of large shoals of immature herring, developing towards maturity during the later months of 1934, it was confidently expected that large shoals of spring fish, spawning for the first time, would be encountered on the northern spring spawning grounds during the early part of 1935. This prediction has been confirmed by the examination of samples recently caught in the neighbourhood of Wick (February 1935).

Whitefish seine net experiments (Plaice) were carried out in September to obtain more data as to the retaining portions of this type of net. Escapes, as in previous experiments (1933), were found to take place through the whole funnel, the wings acting largely as a collecting part of the net. Observations on the food of fish are being continued, especially on Herring, Haddock and Plaice. Fluctuations in the food supply of both pelagic and benthic organisms are also receiving attention.

Following on the discussions which took place in June 1934 regarding the contents of the Administrative Reports, it is proposed that in future the Northern North Sea Report should be modified in form in such a way as to show under the different categories of the work the share taken by each participating country. To facilitate the compilation of such a report, it is desirable that all contributions should be drawn up on a uniform plan. It is proposed, therefore, to suggest to the representatives of all participating countries that the reports should be arranged under the following general headings:—

1. Work at Sea
2. Hydrography
3. Plankton
4. Fisheries — fishing technique
5. Fish — a. Herring
   b. Cod, Haddock and Whiting
   c. Plaice and Lemon Sole
   d. Other fish
6. Shellfish — a. Crabs and Lobsters
   b. Mussels
7. Bottom fauna.

A more detailed scheme will be issued in due course.

The following are the reports on work done within the area by the various countries represented on the Committee.

Denmark.

Research work has been carried out in the area by the "Dana" during different periods in the months April, June and July, when the vessel crossed the area. In April (17th—21st) observations were made at a few stations in the western part of the area. Late in June, some stations were worked especially in the south-eastern part of the area, where also later on in mid-July on the route home from the Faroes a few stations were taken. Pelagical towings, trawlings, bottom sampling and hydrography were carried out.

Bottom sampling was carried out partly with the Petersen Grab (0.2 m.²), partly with Professor KNUDSEN's new type of bottom sampler. The section from North Unst to the Faroes inaugurated on the part of Scotland was taken three times during the cruises to keep up the continuity of observations (21—22 April, 31 May—1 June and 11—12 July). By arrangement with the Royal Danish Ministry of Marine H.M.S. "Hvidbjørnen" on August 21st worked the section from North Unst to the Faroes with echo-sounding apparatus, as it was desirable to have the section sounded carefully by modern methods.

Material from towings, haddock material etc. was collected according to arrangements with the Aberdeen Laboratory and has been handed over to Scotland for treatment.

Pelagic hauls in the Faroe-Shetland Channel showed no Leptocephali this year. Å. V. TÅNING.

Hydrographical observations were carried out from the "Dana" in April, June and July. The observations comprised determinations of temperature, salinity, phosphate and nitrate content. As far as can be judged from the rather restricted material, it seems that the summer minimum of nutrient salts had not been reached on April 20th, but on June 1st it seemed to have been completed. M. KNUDSEN.

England.

The following numbers of fish have been measured at sea in the area during 1934:—

Plaice	Haddock	Cod	Turbot	Total
654	67,847	10,688	123	79,312

The haddock data for the year have been passed on to Scotland for analysis. F. M. DAVIS.

France.

Observations carried out in accordance with the usual programme in the northern sector of the North Sea were made during the year 1934 on board the naval fishery patrol vessels "Ardent" and "Ailette", on board the trawler "Notre Dame de France" on the fishing grounds in the Utsire region, and during the cruise of the research vessel "Président Théodore Tissier". Ichthyologic researches on the biology of the herring, the mackerel and the megrim (*Zeugopterus megastoma*) were continued in the Laboratory of L'Office Scientifique et Technique des Pêches Maritimes at Boulogne-sur-Mer.

Work at Sea.

Itineraries of cruises and objects of the principal investigations made during each cruise were as follows:—

June: Cruise by "Président Théodore Tissier".
Hydrological observations along the line 57°30′ N.; in the Gut; in the Fladen area.
Trawling; dredging; study of the bottom fauna; measurement of fishes — mackerel, haddo whiting, megrim.
Bathymetrical and lithological study of the g logical valley of the Rhine (the Gut); plankt collections.

June, July, August and September.
Hydrological observations on board the pat vessel "Ardent" (Commandant Lieutenant vaisseau KERMARREC) and on the despatch bo "Ailette" (Cdt. Capitaine de Frégate DU TOU
Temperatures and water samples for salini determinations.

August.
Trip on board the trawler "Notre Dame de France
Observations on the fisheries of Utsire.

Herring.

Trawled Herring from the Fladen.

The material collected during recent years, princi ally during the months of July, August and Septembe has been classified according to the stages of sexu maturity of the herrings examined. Herring, t sexual maturity of which ranges from I to III (Hjo stages), are, as a general rule, younger (60 per cen under 5 years) than the herring at stages IV—V—V (30 per cent. under 5 years of age).

On the other hand their mean number of vertebr is higher — 56.7 (56.7 to 56.9) whereas for the fillin and ripe herring the mean is in the neighbourhoo of 56.5 (56.5 to 56.6).

These results, then, confirm the presence in th herring trawling area of the Fladen of herrings Atlantic character having a decidedly high vertebr mean, the spawning time of which must be sprin and of North Sea herring (Bank type) with a mea vertebral count of 56.5 whose spawning time is the end of summer or in the autumn.

Haddock.

The measurements made during the cruise of th "Président Théodore Tissier" are insufficient to enab any conclusions of value to be made.

Megrim.

Mr. J. FURNESTIN, Assistant at the Boulogn Station, has undertaken a study of the biology of th Megrim (La Cardine, *Zeugopterus megastoma* = *Lepid rhombus* Whiff).

The observations show that the mean number vertebrae of the North Sea Megrim is slightly high than that of the Atlantic Megrim.

North Sea = 41.65 ± 0.13. Atlantic = 41.33 ± 0.1

The other measurable characters examined cann be utilised for this discrimination. These appear to variable according to the age and length of the fis The spawning of the megrim in the North Sea appea to be at its maximum from the end of May until th end of June. This seems later than in the Atlant

ıich region spawning takes place principally
·y.

xton.

erial for study collected. No particular obser-
ıs. JEAN LE GALL.

Germany.

investigations on herring in 1934 could not be
d out to the full extent. Only 19 samples
ting of about 3800 herrings were analysed. In
on, two voyages (to Fladen ground and Dogger
) with steam trawlers have been undertaken for
igations at sea. The samples were examined for
, age, maturity and races, but the results are
et available. W. SCHNAKENBECK.

Holland.

drographical investigations in the Northern
ı Sea were undertaken by Holland on board the
tilus" in June—July 1934. The areas visited
east of the Orkney and Shetland Islands, between
and and the coast of Norway, the Skagerak and
the north edge of the Dogger Bank. Samples
collected at each station at various depths. These
tigations have now been made during three
ecutive years.
e only biological work in the area consisted of
samples of haddock scales which were sent to
rand for treatment. J. J. TESCH.

Norway.

shery research work in the area was in 1934
fected to:
our short oceanographical sections executed for
e Fisheries Directorate by means of the "Armauer
ansen" (Dr. RUNNSTRÖM in charge), namely —
) From Utsire, W, 13 Feb. 36 miles, 6 stations.
) — Foina, W, 14 Feb. 21 miles, 5 stations.
) — Haastain, W, 15 Feb. 13 miles, 5 stations.
) — Egersund, SSW, 7 Mar. 23 miles, 5 stat.
urface observations, continuous thermograph
ecords, water samples four times (Feb., May, Aug.,
ov.) for chlorinity.
) Bergen—Reykjavik, "Lyra", fortnightly.
) — —Faskrudsfjord, "Nova", monthly.
) — —Newcastle, "Jupiter", weekly.
) — —Rotterdam, "Ariadne", fortnightly.
he records are treated by the bureau and circulated
nembers as opalograph copies.

he following work has been planned for 1935:—
eries of sections by means of the "Johan Hjort"
ss the Norwegian Deep on to the North Sea
teau in winter-spring, possibly also later in the
r (autumn). The surface observations are to go on
efinitely. O. SUND.

Scotland.

1. Work at Sea.

Both research vessels "Explorer" and "Enid" were in commission during the greater part of the year except for the customary and necessary periods of overhaul and refit. Scientific researches were carried out from March to December in the areas between the Butt of Lewis and the Shetlands and within the North Sea as far south as the Dogger Bank. The need for economy precluded observations being made along the west coast of Scotland.

Periodic cruises across the Faroe-Shetland Channel to the Faroes were undertaken by Denmark and these relieved the Scottish vessel from carrying out the usual work on these distant grounds.

The trawling surveys of the "Explorer" were concentrated largely on haddock but the collection of data on other demersal species in the hauls formed part of the routine duties. Plankton and hydrographic observations were made at all stations.

The motor boat "Enid" was again engaged in inshore areas, principally on the small plaice and young herring populations in the bays and estuaries of the East Scottish coast. A small amount of crab and lobster work was undertaken in the vicinity of Aberdeen. A mesh of net experiment with the Whitefish Seine Net (Plaice) was carried out in Burghead Bay (Moray Firth) in September as a continuation of similar experiments in St. Andrews Bay during the previous year.

2. Hydrography.

A full report is included in the Hydrographical Committee Report on page 69.

3. Plankton.

Collections were made on all the periodic cruises with various types of tow nets. One of the main objects of the investigations was, as in previous years, to define the spawning centres of herring and haddock and to determine the dispersal of the larvae from their points of origin. Representative data have now been collected for these two species and similar observations have been extended to other important species of round and flat fishes.

An intensive study of the food of the herring has been continued. During the year, several successful attempts were made by the "Explorer" to improve the data by taking plankton collections in the neighbourhood of fishing vessels and afterwards securing samples of these drifters' catches with a view to testing the amount and quality of the feeding in relation to the quantity and quality of the plankton in the area.

Investigations on the distribution and abundance of the Copepod, *Calanus finmarchicus*, were continued. In the first half of the year, it was taken in abundance chiefly to the north and west of the Orkney—Shetland line, while in July, when the largest catches were made, the deeper water areas north of Shetland and

west of the Norwegian Deep yielded heavy concentrations of the later immature stages and adults. South of the Forth it occurred sparingly in the catches. Breeding experiments have been instituted at Nigg Aquarium with a view to elucidating the rate of replenishment of the stock and to clear up the anomalous position of the scarcity of males in the North Sea collections.

During the year, there was no great invasion of the Northern North Sea by exotic pelagic forms. Salps were not observed within the area investigated and only a very few Doliolids were taken along the north of Scotland. Several Cuttlefish (*Sepia officinalis*) were taken by commercial trawlers at the end of the year. These are occasional immigrants, the last occurrence being noted in 1932, though in neither year were the numbers so abundant as in the years 1921—1922 when the area from Flugga to the Northumbrian coast was flooded with these "Inkfish". During 1934 numerous cuttlefish "bones" were washed ashore chiefly in the Moray Firth and it is presumed that these bear some relation to the 1932 invasion of the northern area.

4. Fisheries: Fishing Technique.

Comparative tests with Whitefish (Plaice) Seine Nets comprising various combinations of both wings and bag + cod-end were carried out in September 1933 and the results were given in last year's report. A further series of experiments was conducted this year and the results obtained confirmed those of the previous series. The wing meshes, irrespective of the method of hanging, act as a collecting part of the net and selection of the sizes depends on the bag and cod-end portions. These points are illustrated in the mean sizes of Plaice caught by the different nets which are as follows:—

	Seine Net			Plaice Mean Size	
	Wings	Bag	Cod-end	cm.	Inches
1)	$4^1/_4$″	$3^3/_8$″	$3^1/_4$″	25.89	10.19
2)	$5^3/_4$″	—	—	26.35	10.37
3)[1]	$6^1/_2$″	—	—	25.52	10.05
4)[2]	$6^1/_2$″	—	—	25.63	10.09
5)	$4^1/_4$″	$4^3/_8$″	$4^3/_8$″	28.00	11.23

[1]) Natural lie of wing meshes horizontal, i. e. along the wing.
[2]) Natural lie of wing meshes vertical, i. e. from "cork line to lead line".

5. Fish.

(a) Herring.

The investigations on the larval stages were continued on the lines of previous years. Spawning localities were determined by the records of "spawny" haddocks and confirmed by the capture of newly hatched larvae. There appeared to be nothing unusual in the times and places of occurrence. Major spring incidences were observed during March in the region of Cape Wrath, within the sector 15 to 30 miles to N. of Ronas Voe and at the entrance to the Fo estuary. The dispersal of the larvae from the hatch centres along the north coast of Scotland follo the usual north-easterly trend towards the north gateways to the North Sea. There was little evide however, of entry in large numbers into the no western part of the North Sea of larvae from the v Shetland area and it is possible, as indicated f the drift-bottle observations, that dispersal had ta place largely outwith the area north-east of Flug Further evidence of this emigration was the abse of larvae of spring origin in the plankton hauls du May month in the area between the Shetlands Viking Bank, an area which has provided wit recent years large numbers of larvae, the small s of which indicated that they had been hatched in neighbourhood. Larvae from the Firth of Fo spawning grounds were again found to be locali in the immediate vicinity of or within the estua though there was a tendency to extend coastwise a northerly direction.

The great autumn spawning centre off the N Aberdeenshire coast and on Aberdeen Bank was ag very pronounced. The normal route of dispersal fr this centre is southwards with a strong deflect towards the Scottish East Coast, resulting in occurrence of enormous numbers of larger lar within the bays and estuaries, especially of the Fi of Forth. This feature, however, was not obser during the autumn of 1934 and comparatively f larvae were obtained in the hauls within the coas area. They appeared to be absent from the Fo estuary. Recoveries of drift-bottles liberated on spawning grounds in August have all so far b effected on eastern continental shores and it is feasi to assume that the herring larvae during some p at least of their periods of passive drift had follow the same course. During November, the distribut of herring larvae, markedly uniform in size, along Scottish East Coast was again unusual, indicat abnormal conditions. At the end of 1934 the lar had accumulated in the northern area, even as far the Shetlands and the conditions seemed to resem very closely the observed reversal of the curre during the later months of the year 1927.

It is anticipated that the reversal of the curre during the later months of the year will preclud southerly or south-easterly dispersal of any magnitu of larvae hatched along the East Scottish Coast. Th autumn hatched larvae will be carried over the win in the unscaled condition and the scaled stages not be reached till the spring of 1935. The act distribution and relative abundance of the small scaled stages in the bays and estuaries, therefo cannot be assessed with confidence until these co within the scope of the small meshed nets in enclo waters. Special efforts are being made to supplem the observations made in 1928 and to secure comp hensive data for the determination of the effect these unusual physical conditions on the dispersal

rvae, the consequent distribution of the later stages and, ultimately, the degree of recruitment the 1934 autumn brood may make in after to the North Sea herring stocks.

average drift net catches, particularly during tter part of the summer herring fishery, were at all the important Scottish East Coast ports 1934 than in any of the three previous years. esult was due primarily to a substantial increase autumn spawning component of the herring ation, as foreshadowed in last year's report.

ring the early part of the fishery in 1934 the important age groups from the Orkneys to nead had 3 or 4 rings respectively and these s were proved by racial analysis to be derived y from autumn spawning stock. North of latitude N. and extending from the Patch westwards etland the shoals, during the earlier part of the n, showed notable differences in age and race osition from the shoals further south. There were two important age groups having three and five respectively on their scales but the younger was almost exclusively spring spawning, as the 5 ringers were equally exclusively autumn ning.

wards the end of July a large body of maturing mn spawning fish appeared on all drift net nds extending from the south-east coast of and to Peterhead. These new arrivals were cterised by a predominance of fish having 5 r rings on the scales, and it was obvious after xamination of the mass of data collected from arts of the Northern North Sea that they were ed from the shoals which were present in the rs north of latitude 59°30′ N. from April to June. oles containing more than 20 per cent. of autumn ning 5 ringers were recorded in the vicinity of Isle on July 4th and 33 miles N.E. by N. of erburgh on July 17th. After the latter date, 5 rs rapidly became the dominant group on all net grounds as far south as Peterhead, and in ast constituted more than 50 per cent. of the ng landed. In September, the same group made ppearance as spent fish in trawl catches from the en ground. This movement of the adult autumn ning shoals, with a predominance of fish that spawned at least once previously, was similar to suggested by the data collected during 1933, and ormed with the known movements of the water ses in the Northern North Sea.

he spring spawning 3 ringers, which for a time associated with the autumn spawning 5 ringers ved independent changes in their distribution. group did not at any time come within the limits he usual drift net grounds, except at Shetland, re it formed the most important constituent in landings during the early part of the summer. ispersal from the Shetland grounds took place in and these herrings did not again appear in any ntity in the landings from any grounds until tember, when their appearance as the dominant group on the Fladen ground synchronised with a marked increase in the trawl catches, which was maintained throughout September, October and part of November.

A considerable proportion of the spring spawning 3 ringers showed indications of developing milt and roe in October and November and it is anticipated that large shoals of spring spawners are likely to be encountered early in 1935 on the northern spring spawning grounds, most probably in the neighbourhood of the Viking Bank and the northern shores of the Shetland Islands. This has been confirmed by the analyses of samples from the vicinity of Wick in February 1935.

In February 1934, large shoals of young herring, identified as fish derived from the autumn spawning of 1932, invaded some of the bays and harbours of the Moray Firth. This apparently successful brood has given rise nearly a year later to a successful winter fishery in the Inverness Firth, and after its final departure from estuarine waters in the spring, it may be expected to make important contributions of small immature herring to the catches from the shallower drift net grounds during the summer of 1935.

Racial analysis of a sample of herring caught in the neighbourhood of Barra Head in September indicated that the herring in this region are almost exclusively spring spawning. The samples obtained from the Clyde have been very uniform with regard to age, from 80 to 90 per cent. of the fish examined having three winter rings on the scales (year-class, spring 1931). The prolific 1928 brood was almost absent from the Clyde shoals after the spawning in the spring of 1934 and the few survivers of this brood are likely to be encountered again only in small numbers during the spawning season in 1935. The 1931 year class now dominant in the Firth has, like the 1928 year class, shown comparatively poor growth. In October they had an average length of just over $9^1/_2$ inches. It is probable, however, that the spawning shoals will be partly recruited by herring with a better growth rate derived from waters beyond the Clyde.

In last year's report it was indicated that in view of the numerical strength in both areas of the brood hatched out in the spring of 1931 the prospects for the Forth and Clyde fisheries were encouraging for at least another year. It has not yet been possible to test the accuracy of this statement, but the importance of this brood, after it had acquired its third winter ring, has been one of the main features of the data collected during 1934. It was the outstanding component in the shoals north of latitude 59°30′ N. from April to June, on the Fladen ground from the beginning of September until the end of November, and was the only important group in the samples obtained from Barra Head in September, so that obviously conditions for brood survival must have been generally favourable on the spring spawning grounds in 1931.

Perhaps the most encouraging feature in the results of the summer fishery during 1934 is the proof that

Germany.

See B. III. 4 and B. IV. 5.

Scotland.

At the cruise of the "Explorer" in May, no herring larvae of spring origin were secured outwith the immediate vicinity of the Firth of Forth. Larval pleuronectids, gadoids and ammodytes occurred very sparingly. Haddock larvae were not observed within the area.

During August larval fish, chiefly inshore species, were moderately common. No herring larvae were obtained, but a few sprat larvae were taken on the western and northern edges of the Dogger Bank.

4. Food of fishes.

Belgium.

Laboratory work was carried out on food of fishes, as well as on fish parasites, constitution and mechanism of air bladder, etc.

Denmark.

Investigations of the stomach content were made from the "Dana", in the Horns Reef Area on cod, haddock, dab, and plaice.

France.

L'examen des contenus stomacaux était poursuivi régulièrement.

5. Marking experiments.

See B. IV. 3 and 4.

6. Experiments on catching power etc. of fishing gear.

England.

A commercial experiment on the catches obtained with cod-end meshes of commercial size and with enlargened cod-end meshes was carried out on the hake, in the Atlantic slope area. The results confirmed the North Sea experiments of 1933.

7. Methods.

Germany.

A summary report on the methods used in connection with the investigations into the pelagic fry and the larger forms of plankton from the hand of the late W. Mielck is ready for publication. Although this report mainly concerns the Baltic material it is of interest to all areas (22).

II. Cod and Haddock.

Denmark.

Trawlings were carried out to localise the younger year-classes and collect material for age determinations. The I-group of **haddock** was found especially south of the line Horns Reef—Tail End of Dogger—Aberdeen. The catches were lower than in 1933, but approximately the same level as in 1932. The cat of the year class 1933 of **cod** was better than t catch of the year class 1932 in 1933.

England.

Cod. In last year's Report, page 40, the cod w referred to as presenting no urgent economic proble but was under routine observations, therein describe These provided current evidence as to the stabili of the reassuring conditions found (9). Observatic at present to hand give grounds for some misgivin though certainly not sufficient yet to invalidate t description of the problem as "not urgent". T matter is receiving particular attention and t possibility of improvements in routine of mark investigations is being investigated all the mc actively.

Haddock. The measurements of haddock ma at sea have been placed at the disposal of the Fishe Board for Scotland.

Germany.

Material for age determination of **haddock** w only occasionally collected during the voyage ma by a cutter to the southern part of the Schlickba where the seine produced good catches of old haddock within limited areas.

Holland.

At the Ijmuiden market the measurements of t various size categories of **haddock** were continu as far as other work permitted.

Scotland.

Five hauls with the commercial otter trawl we made within the area in May and seven in Augus Haddock and whiting were the predomina important species, while long rough dabs a *Gadus esmarki* were also taken in abundance.

The **haddock** stock consisted largely of t three year classes 1933, 1932 and 1931 in descendi order of magnitude, the captures of older haddo being relatively insignificant. The majority belong to the 1933 brood which formed quite 70% of t catches. The paucity in numbers within the area the prolific 1931 brood is rather surprising a indicates both mortality and absence of a retu feeding migration from the northern deep wat spawning grounds. Baby haddock of the 0-grou were found scattered over the area in August b were only taken in small numbers.

III. Herring.

1. Survey of Stocks and Landings.

Belgium.

On the Belgian and French Coasts during t spent herring season work was carried on uninte

ions indicated its appearance in small numbers
se latter areas. During July, good concentrations
observed north of the Fisher Bank, in the
ast of the Moray Firth, on Bressay Shoal and
ta. The captures were of a patchy nature but
every indication that these one year old
ketable fish formed a stronger component of
ddock stock than the 1932 group at the corres-
ng period in the year 1933. This year class does
pear, however, to be so strongly represented
t of 1931 at the same age.
h the fading out of the older year groups, the
ion in numbers during the last two years of
31 brood and the attrition and relative scarcity
32 fish, it is evident that during 1935 two year
h (1933 brood) will play an increasingly important
n the commercial catches. This brood was only
rately good and the intensive fishery to which
be subjected over the whole range of its distrib-
will, natural fluctuations apart, profoundly
its potential importance as a spawning stock in
ding years. Moreover, the group, having been
y concentrated in the Middle North Sea, in the
erly parts of which growth is quicker than on
northerly grounds, the entry into and passage
gh the various market categories will be more
y.
us while the landings of smaller categories during
will be greater than those of the previous year,
atches of medium-sized haddock, in spite of the
ty of three year old fish, are likely to be main-
d at a fairly steady but not high numerical
By the time the whole of the four year old
ock have passed into the large category the
st growing two year old fish will be approaching
lium" size. The landings of "large" haddock will
st almost entirely of 1931 fish which, also, will
itute by far the largest component in the 1935
ning shoals.

od of Haddock.

e collection of data on the stomach contents of
lock has now been extended to include all stages
e life history of the species and throughout the
ter part of its area of distribution. A detailed
rt is in process of preparation as a continuation
elaboration of a preliminary paper on the "Food
Feeding Habits of the Haddock" by Mr. A.
HIE in Rapp. et Proc.-Verb., Vol. LXXX,
16—19.

) Plaice.

stimation of the stock of young plaice inhabiting
East Scottish Coastal Zone was continued during
t on the same lines as in previous years. A total
28,597 plaice was measured and otoliths from
per cent. of these fish were extracted for age
rmination. Samples of stomachs of the different
groups were taken throughout the year, but
fly during the summer months at the height of
feeding season. The age composition of the plaice stock consisted of representatives of age groups O to V.

Accession to the stock of the year's brood of plaice was first observed in the second half of June and from then onwards positive records were obtained in all the localities sampled. A reliable estimate of the relative strength of this year's brood, however, cannot be made until the spring or summer of 1935. An outstanding feature was its occurrence in Aberdour Bay in much greater numbers than hitherto recorded from that locality, and along with other observations the evidence points to a more favourable distribution along the Aberdeenshire and Kincardine coasts than on other sectors of the east coast.

One year old plaice, however, predominated over all the other groups combined, except at the Firth of Forth stations. In St. Andrews Bay, one of the principal nursery areas, this year class was particularly prominent and represented the greatest frequency of any single age group recorded there in the "Enid" observations. From observations along the whole of the East Coast, its frequency distribution can now be regarded as more or less uniformly good with the possible exception of Aberdeen Bay. The records of two year old plaice during 1934 confirmed the low frequency distribution of this year class in the more northerly localities and indicated slight improvement in numbers in the areas south of Aberdeen. The numbers of three year old fish have greatly diminished through fishing operations and migration to deeper water outwith the "Enid" investigations. In St. Andrews Bay, however, despite the fact that the bulk of the group continued to be below minimum marketable size (25 cm.) it has not quite maintained the position anticipated. In Aberdeen Bay, toll has been taken of this year class since the summer of 1933, for, by reason of the much higher growth rate in this locality, a considerable proportion of the group had entered sooner into the category of marketable size. With further depletion, comparatively few representatives were present by the summer of 1934. The four and five year groups were weakly represented but in open areas this is to be expected from intensive fishing operations and in all areas largely on account of migration on the nearer approach of maturity.

Observations made during the period October—December showed that the proportions of the various age groups had remained more or less constant throughout the year. In all but Burghead Bay the stock in closed areas showed no wider variations in percentage age compositions than might be expected. In open areas the constancy of the proportions is suggestive of a relaxation in fishing through scarcity of fish. This scarcity manifested itself in hauls taken by the "Enid" in practically all localities during October—December.

Growth rate of the brood of the year was about the same in northern localities as for the corresponding group in 1933. On the southern section of the coast it was less uniform and showed greater local variation compared with 1933. No appreciable difference

between 1934 and 1933 is observable in the increment of one year old fish except in Aberdeen Bay. Here the increase (13.5 cm.) exceeds that for the corresponding group last year by nearly 4 cm. Two year old fish also met with more favourable conditions in this locality, but elsewhere, with the exception of St. Andrews Bay, which is the same for both years, the tendency was towards poorer growth compared with 1933. Three year old plaice also exhibited a higher increment in Aberdeen Bay but in Burghead Bay, growth of this group was at a slower rate as shown by the increment of the same group in St. Andrews Bay, exceeding that of Burghead by approximately 2 cm. There would thus appear to be evidence of correlation between numbers and growth and a suggestion of overcrowding of this group in Burghead Bay as compared with St. Andrews. For other localities there is little difference in increment between the years 1934 and 1933.

Food of Plaice.

Observations on the available food supply in the nurseries for plaice along the East Scottish coast continue to form a major part of the inshore investigations. The biological factor is being studied from examination of the stomach contents of fish caught in the different depth zones. Variations in the food supply are also being investigated by trawl and dredge. These studies are being correlated with physical and chemical conditions.

6. Shellfish.

a. Crabs and Lobsters.

Observations on the moulting and growth rate of lobsters confined in boxes at the Bay of Nigg aquarium were continued throughout the year. The numb records of casting since these observations comme in 1931 now totals ninety. With only five excep possibly attributable to the imposition of restr conditions, all castings occurred between June October inclusive, July, with 41 or 46 per cent. the most favoured month. The additional growth data for these experiments suggest that under conditions, a period of about seven years wil required for a lobster to reach a size of 8 in The three smallest lobsters under observation July 1933, again each moulted twice during 1 The two males, both $3^7/_8$ inches in length v received have grown to 6 and $6^1/_8$ inches respecti The female, 4 inches in length in 1933, now meas $5^3/_4$ inches. It is hoped that these lobsters, along others which measured between 6 and 8 inches v placed in the boxes, will yield direct evidence as t length and age at which maturity is reached.

Marking experiments on crabs and lobsters carried out during the year in the vicinity of Aberd

7. Bottom Fauna.

The work on the bottom fauna has been contin during the year and special collections were mad Aberdeen and St. Andrews Bays with a view correlating the quantity and quality of the bot fauna with the growth rate of fishes in those ar

Sweden.

It was found impossible for Sweden to undert any researches in the Northern North Sea area du 1934. A. R. Molander

Summary of 1934-cruises.

Denmark.

S/S "Dana"; Dr. Tåning; Apr. 11th—21st, June 1st—30th, July 12th—16th: net towing, trawling, bottom sampling, marking of 749 spec. of plaice.

France.

S/S "Président Théodore Tissier"; Dr. le Danois; en route: herring, mackerel and hake.

Holland.

H.M.S. "Nautilus"; Dr. Tesch; June 24th—Aug. 10th: haddock.

Norway.

S/S "Armauer Hansen"; Dr. Runnstrøm; Febr. 13th, 14th and 15th, March 7th: sections 36 miles W. from Utsire, 21 miles W. from Foina, 13 miles W. from Haastain and 23 miles SSW. from Egersund resp.

M/S "Ossian Sars"; Dr. Dannevig and Mr. Løversen; Jan. and monthly short cruises from Apr.-Nov.; Norwegian Skagerak coast: oyster culture. S 10th—21st: O-group of cod.

Scotland.

S/S "Explorer"; Mar.-Apr.; N. W. North distribution of diff. age-groups of haddock at he of spawning season; occurrence of newly hatc herring larvae. Apr.-May: Mid North Sea: freque of occ. of 1933 haddock brood. May: N. W.—N North Sea: freq. of occ. of diff. age-groups of dock. June-July: N. E.—N. W. North Sea: freq occ. of 1933 haddock brood in the deeper north and eastern areas; observations on the dispositio the drift net herring fleet east of the prime merid securing of commercial samples of herring. Aug Mid. North Sea: freq. of occ. of the various y classes of the haddock; at Fladen ground: distr the herring shoals, locus and extent of trawl fis for herring. Sept.: Moray Firth: plaice seine ex ments. Oct.: N. W. North Sea: freq. of occ. of age-groups of haddock; distr. and freq. of occ larval herring. Nov.-Dec.: N. W. and Mid. North freq. of occ. of var. age-groups of haddock.

SOUTHERN NORTH SEA

1934.

By

A. Bückmann.

iction.
rk at Sea.
h.
. General.
1. Statistics and Ichthyometrics.
2. Littoral Fishing.
3. Eggs and Larvae.
4. Food of Fishes.
5. Marking Experiments.
6. Experiments on Catching Power of Fishing Gear.
7. Methods.
. Cod and Haddock.
. Herring.
1. Survey of Stocks and Landings.
2. Rate of Growth.
3. Young Herring.
4. Larval Herring.
5. Herring Races.
6. Food of Herring.
IV. Plaice.
1. Survey of Stocks and Landings.
2. Rate of Growth.
3.—4. Marking and Transplantation Experiments.
5. Eggs and Larvae.
6. Racial Investigations.
V. Other Fish.
C. Shellfish.
D. Benthos and Deposits.
E. Plankton.
F. Hydrography.
Scientific papers connected with the Committee's work published in 1934.

INTRODUCTION

regards the question of protection of undersized sh, in particular of the plaice, which is of special tance in the Southern North Sea area, it is asure to confirm that great progress has taken

er careful consideration the International Council acknowledged the necessity of such protection s scientific meeting of 1932. At the biological al meeting of June 4th and 8th, 1934, appropriate s for such protection were also pointed out by the cil, namely the use of a larger mesh and the duction of minimum sizes which would be of greatest practical importance for broad flat such as the plaice. At the sitting on May 11th, already the Southern North Sea Committee strongly recommended the introduction of num sizes in respect of plaice. This recommend- has not been without effect. In addition to ations as to minimum sizes which have been for several years past in Denmark for plaice, minimum sizes have also been introduced in many, England and Sweden, and the introduction gradually increasing minimum size is being ared in Holland. Further regulations regarding mum sizes and minimum mesh for the protection e young fish of other species have been introduced others are under serious consideration.

ch protective measurements, however, do not ve the necessity of constantly observing the of food fishes of our area. Relevant work has carried out persistently for several years already, ly by combined efforts, at sea and in the markets, as regards herring, cod, haddock, plaice, sole, sprat, and other species, and has been continued also this year, as will be seen from the following report. It gives a picture of the composition of the stocks in their relation to the fluctuations and the fishery, and permits, to a certain degree, predictions as to fishing possibilities for the coming season, which are of immediately practical importance. It is worth mentioning that the sole has gradually been of increasing interest within our area. Thorough investigations into this fish are therefore strongly recommended for the future. A report on the sole published during the period under review purposes to facilitate such investigations inasmuch as it summarizes our present knowledge.

Further, the following report shows that some other series of investigations are now being carried out with greater intensity than before.

First to be mentioned are the investigations into the fry, the importance of which should be specially emphazised. In the first place they are the best means of testing the question whether the capacity of reproduction of the stock of food fishes is keeping its present standard or whether any danger is present of a decrease due to the fishery. Secondly they may serve for the study of the causes of fluctuations. This is one of the most important scientific problems in the research of to-day.

Furthermore, the plankton investigations are carried out much more intensely than before. This is due to two problems of widely different nature: first the question of the influence of plankton on the

feeding conditions, the formation of shoals and the movements of pelagic fish, especially herring. The immediate practical importance of the question is evident. Secondly, plankton investigations in supplementing hydrographic investigations serve the purpose of studying the movements, the origin and the mixing of the water masses. Exact knowledge of these conditions is of biological importance: according to our present knowledge it is a working hypothesis that the causes of fluctuations may be attributed to the passive transport of pelagic fry by the currents.

Experience has already shown that hydrographic investigations can be of particular value to biological research in the very connection with investigations into fry and plankton.

For the first time, this report contains the co investigations of the Danish laboratory at Skalli The lines of research of this institute are also foll by other countries, as for instance German connection with the work regarding reclaimi land. This means a great complement to the in igations in the coastal zones, the importance of v has always been stressed in our area.

The opportunity is here used to express our si gratitude to the various companies, captains, crews of fishing vessels, light vessels and p vessels who have given the work of the Comm their valuable support.

A. WORK AT SEA.

Belgium.

Trawlings were carried out in the coastal area within 20 miles off the Belgian coast. Periodical crossings of the Channel entrance on the line Deal—Gravelines were made by the fishery patrol vessel "Zinnia", four hydrographical stations being worked each time.

Denmark.

"Dana" was working in the Southern North Sea in two periods during the cruise of 1934, viz., April 11th—16th and June 1st—28th. Transplantations and marking of plaice were undertaken in April. In the Horns Reef Area fishing experiments with trawl were carried out on June 15th—19th at 29 stations, especially for investigations into the stock of plaice. Further trawlings, bottom sampling with the Petersen grab and the Knudsen bottom sampler, pelagic towings and hydrographical investigations were carried out in both periods. From "Biologen", fishing experiments with the "Eel-tog" (a fine meshed otter seine) were carried out in the Nissum Broad on April 17th—18th (5 stations), on May 29th (1 station) and on September 20th—21st (6 stations).

England.

The "George Bligh" was in continuous commission from the end of April till the end of October. Thirteen voyages in all were carried out. Two comprised trawling work and the remainder were in connection with plankton, especially phytoplankton and hydrography in connection with the migrations and concentrations of the herring. The M.V. "Onaway" was available throughout the year and carried out sampling of the herring and sprat shoals during the appropriate seasons. She also made special plankton and hydrographical voyages, both independently and in close touch with the "George Bligh".

The work on fish eggs and larvae on the Varne light vessel started in 1932 was continued and supplemented by work on the Galloper and Sandettié light vessels. The latter was made possible by the cooperation of Professor Le Gall. The work at of the English naturalists and fish measurers, routine current measurements and release of bottles from light vessels, surface sampling steamship routes etc. have been continued, o to the courtesy of Trinity House and the ow masters, and officers of the vessels concerned.

France.

Les travaux de recherches dans le Secteur Su la Mer du Nord ont été poursuivis en France p Laboratoire de l'Office Scientifique et Technique Pêches Maritimes à Boulogne sur Mer, en coll ration avec la Station de la Mer du Nord et d'Isl et l'armement Boulonnais. Au cours d'une de sorties le navire de recherches "Président Théo Tissier" a travaillé dans ce secteur en Juin 1934. observations hydrologiques et planctoniques bien que des chalutages furent exécutées.

En Septembre—Octobre, pendant les crois de l'Aviso "Ardent", sur les pêcheries de ha de diverses observations sur les pêcheries et observations hydrologiques furent faites. En vembre, à bord du drifter "André Louis", Boulogne, des observations hydrologiques, des surations de harengs et des samples de plan furent pris. Des observations permanents ét poursuivies à bord du bateau feu Sandettié, regar hydrologie, plancton, météorologie.

Des observations bimensuelles étaient effec sur la route de paquebots Dunkerque-Folks (Températures et prélèvements d'eau en surface

Germany.

The S/S "Poseidon" was not commissioned for in this area before January, 1935. The M/S "Aug of the "Biologische Anstalt" has carried out res cruises throughout the whole year. From Janua June the distribution and the abundance of the he larvae were studied. During April the catching p of the cutter-trawl with plaice-bag was teste parallel hauls. Moreover observations were ca

n the spawning of the spring herring in the nsea off List. During May and June the food ocks were investigated — in particular those ice and sole — on four sections between Nor- and Amrum; similar investigations were also out during July and September in the vicinity goland. Further cruises from June to September made for the purpose of tracing shoals of young g. In the course of all these cruises, as well others, the opportunity was used to study the ton communities, particularly those of phyto- ton, and the hydrographical conditions.
ring a cruise of the patrol vessel "Weser" from er 2nd to November 5th into the Doggerbank nd the northern part of the Hoofden, and on a of the patrol boat "Elbe" from November 8th cember 12th into the Hoofden and the eastern of the Channel, investigations were made into sh fry (especially herring larvae), and the larger forms of plankton, as well as into the surface phyto- plankton and the hydrographical conditions.

During three fishing voyages of a German high sea cutter in May and August, observations were made on the fishing, especially of undersized fish taken in the hauls.

Observations on herring were collected by the "Fischereibiologische Abteilung" in Hamburg during the voyage of a fishing vessel in the Doggerbank area at the end of October.

Holland.

During a cruise of the fishery patrol boat "Nautilus" in May, the distribution, occurrence and age-composition of the stock of plaice off the Dutch coastal zone was studied on 3 sections of altogether 11 stations.

B. FISH

I. General.

1. Statistics and Ichthyometrics.

B. II—V.

and.

e collection has been continued in England and number of the chief species measured are ap- mately as follows:

At Sea:

ice	Haddock	Cod	Turbot	Total
4	51,570	13,150	12	65,286

On the markets:

	Haddock	Cod	Herring	Total
3	8,010	34,926	70,203	174,582

many.

ie biological-statistical observations were con- d at the Wesermünde market by the "Biolo- ie Anstalt Helgoland" and "Institut für See- erei in Wesermünde". A paper by Dr. LUND- on measurements of the landings by the Ger- high sea fleet is ready to go to press. Further, acts from the journals of the fishing vessels have made and are being compiled. They comprise t 4,000 cruises, from which the exact fishing e, number of days absence and number of hours ng as well as the exact quantity caught of each ies are determined. Some results of these inve- ations are stated in a preliminary publication (19)[1]). nce November information has been collected n all vessels unloading in Wesermünde as to correct fishing place and number of fishing days. hin the North Sea the most important fishing places have been kept distinct, such as Viking Bank, off Utsire, Fladenground, Lingbank, Gut, Fisherbank, Hanstholm, Jutland Bank, Dogger Bank, Schlick Bank, Helgoland grounds etc. A monthly publication of the catch per fishing day of the most important species at the several grounds were published for the first time for the month of November 1934 for immediate use by the fishing industry (20).

The collection of data regarding landings and duration of fishing of high sea cutters has been considerably increased since August 1934, at the most important cutter market: Hamburg. Detailed records were kept of the exact locality of fishing in the German Bight.

2. Littoral fishing.

Belgium.

Additional observations were collected regarding the destruction of young fishes.

Denmark.

See D.

France.

See B. III., 4 and B. V.

Germany.

See B. IV, 1 and D.

3. Eggs and Larvae.

Denmark.

Eggs and larvae were collected as in previous years.

England and France.

See B. III. 4 and B. IV. 5.

[1] See the list of litterature at the end of the report.

Germany.

See B. III. 4 and B. IV. 5.

Scotland.

At the cruise of the "Explorer" in May, no herring larvae of spring origin were secured outwith the immediate vicinity of the Firth of Forth. Larval pleuronectids, gadoids and ammodytes occurred very sparingly. Haddock larvae were not observed within the area.

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II. Cod and Haddock.

Denmark.

Trawlings were carried out to localise the younger year-classes and collect material for age determinations. The I-group of **haddock** was found especially south of the line Horns Reef—Tail End of Dogger—Aberdeen. The catches were lower than in 1933, b approximately the same level as in 1932. The of the year class 1933 of **cod** was better tha catch of the year class 1932 in 1933.

England.

Cod. In last year's Report, page 40, the cod referred to as presenting no urgent economic pro but was under routine observations, therein descr These provided current evidence as to the sta of the reassuring conditions found (9). Observa at present to hand give grounds for some misgiv though certainly not sufficient yet to invalidat description of the problem as "not urgent". matter is receiving particular attention and possibility of improvements in routine of m investigations is being investigated all the actively.

Haddock. The measurements of haddock a at sea have been placed at the disposal of the Fis Board for Scotland.

Germany.

Material for age determination of **haddock** only occasionally collected during the voyage m by a cutter to the southern part of the Schlickl where the seine produced good catches of haddock within limited areas.

Holland.

At the Ijmuiden market the measurements of various size categories of **haddock** were conti as far as other work permitted.

Scotland.

Five hauls with the commercial otter trawl made within the area in May and seven in Aug Haddock and whiting were the predomi important species, while long rough dabs *Gadus esmarki* were also taken in abundance.

The **haddock** stock consisted largely of three year classes 1933, 1932 and 1931 in descen order of magnitude, the captures of older had being relatively insignificant. The majority belo to the 1933 brood which formed quite 70% of catches. The paucity in numbers within the are the prolific 1931 brood is rather surprising indicates both mortality and absence of a re feeding migration from the northern deep w spawning grounds. Baby haddock of the 0-g were found scattered over the area in August were only taken in small numbers.

III. Herring.

1. Survey of Stocks and Landings.

Belgium.

On the Belgian and French Coasts during spent herring season work was carried on uni

ly on customary lines. The biological scale ow been established for 5 years. Samples have ollected and examined from the region between nders and Cape Gris Nez, with a view to settling uestion of the origin, affinities and spawning l of the annual concentration of spents.

nd.

annual examination of the stocks of herrings e Northumberland coast and the East Anglian has again been carried out.

East Anglia: The measurement of the gs landed by commercial drifters was done westoft and Yarmouth and in all, 60,721 fish measured. At the same time samples of herrings examined in the laboratory for age, length and ity containing 2,800 fish in all, and from the s of these latter investigations, the age of the

Taille:

Longueur en cm....	19	20	21	22	23	24	25	26	27	28	Engin
ittié-Dyck ..... %	0.1	2.1	5.8	6.5	9.6	27.4	28.2	12.7	6.5	1.1	Chalut
Somme (Gr. I) .. %		0.6	3.0	8.9	15.5	30.1	26.5	12.1	2.7	0.7	Filets
Somme (Gr. II) ... %		0.1	1.7	2.8	6.3	28.0	38.8	16.3	4.8	1.2	Filets

Age:

Ans...	3	4	5	6	7	8	9	10	Plus	
s.....	1931	1930	1929	1928	1927	1926	1925	1924	1923	et avant
nne générale .. %	13.5	5.5	57.5	13.0	7.4	2.0	0.6	0.5	—	

l fish was obtained. This work gives a complete e of the weekly changes in age composition ghout the season.

North Humberland: Age determinations measurements have been made by the Dove e Laboratory at Cullercoats, and these represent hanges in the stocks of herrings on the local ds between May and September. Attempts also been made in June and August on this to obtain data which would help to extend nowledge on the spotting of herring shoals by s of the Echometer, but in May bad weather scanty concentrations of fish hampered the and in August the work had to be curtailed. new line of research has been started in the e areas. A simple system of charting the catches rrings by commercial drifters has been evolved, t is now possible to produce rapidly contoured s for each half-week throughout the season. e charts show the movement of herring concen- ons, and when studied in relation to changes nd directions, they will throw some light on the s of fish on the various grounds. This work is e continued.

e Forecast of the East Anglian herring fishery again been issued, this year by the Ministry as fficial publication. The expected age and length osition as published in August proved to be rate, and in general the prediction was good.

A scientific paper on the "Lunar Influence on the East Anglian Herring Fishery" has been published (24).

As an addition to the above, the measurement of the various trade categories of cured herrings has again been carried out at Yarmouth and Lowestoft. 6,682 fish were measured.

Since the publication of the report on the mesh experiments in 1933, it was decided to review the size of commercial meshes every two years, so there have been no new observations made during the current period.

France.

La population de harengs de la Manche Orientale et du Sud de la Mer du Nord a été étudiée. Les résultats provisoires obtenus pour la saison d'hiver (1934—35) — non encore terminée — sont les suivants:

La classe 1929, dont nous avions signalé l'importance en 1934, se montre encore exceptionnellement bonne dans ces concentrations. La classe 1927 reste supérieure à la moyenne et est bonne. Les classes 1925, 1926, 1928 et 1930 sont toujours déficitaires. La classe 1931 s'annonce comme devant être bonne dans les futures concentrations de harengs dans la région envisagée.

Un rapport sur les observations de la saison 1933/34 a été publié (14, 15).

Germany.

The herring investigations were recommenced by the "Fischereibiologische Abteilung" in Hamburg under supervision of Professor SCHNAKENBECK; the work, however, could not yet be fully carried out in accordance with the programme. 19 samples of herring comprising some 3,800 herring from the western North Sea were investigated as to length, age, maturity, and race. The results are not yet ready for publication.

Further observations have been carried out at sea on the voyages of steam trawlers to the Fladenground and in the Dogger Bank area.

Holland.

From September to December 1934 (and during January 1935) weekly samples of drift net herring

were investigated and the total material for this year is thus higher than before (some 3,000 specimens). In comparing the results it could already be seen that the year-class 1929 (the V-group) forms a high percentage. In 1933 this same year-class was very numerous as the IV-group.

Scotland.

Small catches of herring were obtained at the western edge of the Dogger Bank in the course of the trawling operations of S.S. "Explorer" in this area.

2. Rate of Growth.

England.

The calculation of the length l_1 is being continued, but no further addition to our present knowledge can be made at present.

3. Young herring.

Germany.

Some trawlings were made for the purpose of catching young herring in their first or second year during the months of July to September in the inner part of the German Bight. Herring in their second year were, however, caught in single specimens only. In the open sea one-year herring were caught in great numbers near the estuaries and on the edge of the waddensea only.

France.

Les observations sur les jeunes harengs pêchés dans la zone côtière étaient continué.

4. Larval Herring.

Denmark.

Pelagic fishing for postlarval stages of herring was carried out on the "Dana" cruises.

England.

Observation of spawning places of the herring by means of the location of catches of "Spawny" haddock, is routine work and has been continued.

The proposed routine investigations on light vessels started in the winter of 1933/34 and are being continued in the winter of 1934/35. The technique was established by preliminary experiments in the winter of 1932/33. Hauls are made daily with the International Net at the Varne, Galloper and Sandettié lightvessels. At the former two vessels concurrent observations are made by means of a drift indicator. It is hoped that after a period of years this work may yield an index of the fluctuations in the exchange of the young planktonic stages of herring and plaice between the North Sea and the Channel. The plaice and herring larvae are all measured and the eggs sorted into stages of development. The material is now being worked up.

France.

Les recherches ci-dessus nommées sont avar
par des prises de plancton du bateau phare Sande

Germany.

Investigations into the appearance of her
larvae in the inner German Bight during the wi
and the spring of 1934 were continued. The larvae s
to have been uncommonly rare this year.

Catches by means of the Helgoland larva net
made by the patrol vessel "Weser" on the Do
Bank herring grounds and near Smith's Knoll du
October 1934 in order to investigate the distribu
and the frequency of herring larvae in these ar
The work, however, was greatly curtailed on acc
of bad weather. At various positions on the Do
Bank and the Cleaverbank and near Flamboro
head small larvae of mean length: 7 to 10 mm.
caught at the rate of 100 to 300 specimens per sq
meter. A certain number of these larvae were
carrying the yolk-sac or its remains, although s
imens of more than 8 mm. in length have mostly
carded the yolk-sac. As far as the northern par
the Hoofden is concerned, few larvae are met
the English coast only at the end of October.

During a cruise by the patrol vessel "E
(November and December) in the herring dist
of Smith's Knoll and in the English Channel, t
was encountered a very representative group of her
larvae, a considerable part of which plainly ca
the remains of the yolk-sac. They were found
the southern end of the deep channel as in 1
but this year they also proved to extend as far
as the light vessel Noord Hinder. Some 800—1
larvae were caught per square meter. The main le
was $9^1/_2$ to 10 mm. even of those still carrying y
sac. From these observations it appears that by
middle of November an important spawning t
place in the southern part of the Hoofden betw
the Thames estuary and Hinder grounds. In
however this was not the case, the spawning
that year taking place somewhat later and far
south in the Straits of Dover. In 1934 only
few specimens of larvae were caught in these wa
and in the eastern part of the Channel at a sin
season. The number of larvae caught in 1934 in
neighbourhood of Smith's Knoll — Leman was n
smaller than in 1933.

Further investigations into the distributio
herring larvae in these areas were carried out du
January 1935. A preliminary report on the re
for the year 1933 has been published (28).

During April 1934 investigations into the spaw
of the spring herring were carried out in the wadde
near List. Eggs were very scarce and mostly f
on *fucus*. The sea-grass disease has here ro
the herring of a very important substrata for
eggs. Last year's growth of sea-grass has obvi
been universally ruined. During April young la
of the spring herring were caught in mod

ers at the waddensea off List. Preliminary ments on rearing herring larvae in the laboratory been carried out.

and.

ing the May cruise of the "Explorer", no g larvae of spring origin were secured outwith mediate vicinity of the Firth of Forth.
ing the August cruise, no herring larvae were ned in our area.

5. Herring Races.

ce.

stabilité du groupe II, au sud de la Somme, int de vue de la moyenne vertébrale, se confirme e en 1934 (moyenne 56.70 ± 0.06). Le type le la Mer du Nord (Bank Herring) a dominé s frayères du Dyck et du Sandettié et la moyenne brale des harengs de cette région reste, pendant la saison de ponte, voisine de 56.50 (56.53 ±

tre l'embouchure de la Somme et le Cap Gris (groupe I), la moyenne vertébrale des harengs de même, voisine de 56.50 (56.50 ± 0.10); ui indiquerait une forte pénétration de harengs ype Mer du Nord en Manche.

and.

cial investigations were again carried out on herring samples collected from September, 1934, anuary, 1935, in the Flemish Bight. The results rm those published in last year's report (26).
uring the winter of 1934 young herrings from the n-western Dutch coastal waters were subjected onthly countings of vertebrae. As a whole, the ts of the investigations agree with those of er years. Bank herrings occurred mostly in the ern parts of the area; otherwise the races were mixed. Adult herrings were caught in small bers only.

6. Food of Herring.

land.

e stomach contents of nearly 5,000 herring have examined from the Shields Area, and from Great Fisher Bank, Viking Bank and Klondyke nds.

IV. Plaice.

1. Survey of Stocks and Landings.

mark.

uring June, at the fishing experiments of the na" in the Southern Horns Reef Area, 20% of stock between 10 and 30 m. depth belonged to 1928 year-class. At these depths the year-class 3 formed 27% of the stock, year-class 1932 % and each of the year-classes 1929/31 11—12%. In the rather narrow zone between 5 and 10 m. depth about 53% of the stock belonged to the I-group (1933), about 30% to the II-group (1932), and 1% only to the VI-group. Outside 30 m. only one plaice was caught in a 2 hours' haul (4 stations). It would seem that the strength of the year-class 1933 has been about average, but because the season for fishing experiments is different from that of former years, a final statement from the result of the fishing experiments is not possible.

On the occasion of the transplantation of plaice from the North Sea to the Belt Sea and the Sound, otoliths were examined from 1,126 plaice caught about April 1st by the Danish seine at Graadyb L.V. and E. of Skallingen at depths varying between 5—15 m. The length of these plaice was about 19—25 cm. and the percentages of the age-groups were:

Age-group...	II	III	IV	V	VI	VII
Year-class..	1932	1931	1930	1929	1928	1927
Percentage .	0.7	3.5	21.7	21.6	51.7	0.6

The year-class 1928 (as VI-group!) thus contributed some 50% of the quantity transplanted (in 1933 this year-class contributed about 75%). In 1928 the very rich year-class 1922 as the VI-group contributed 23%. This predominance of the year-class 1928 illustrates the great strength of this year-class as compared to the strength of the younger year-classes.

In the Nissum Broad the fishing experiments with the Eel-"tog" during April and September gave the following average number of plaice per 30 minutes haul:

Age-group...	0	I	II	III	IV	V	VI
April 1934	0	27	81	28	8	0.3	1
Sept. 1934..	31	225	47	13	1	0	0

It is of special interest to compare the average number of plaice of the I-group in Sept. 1934 (year-class 1933) with that of the number of the I-group found in autumns of previous years. This comparison shows that the representation of the year-class 1933 was about $^2/_3$ of that of the year-class 1925 and about $^1/_3$ of that of the year-class 1922, but about twice the representation of the year-classes 1929 and 1930 and about four times that of the year-classes 1931 and 1932.

Measurements of different market categories in Esbjerg fish market have been taken in February, March, and May to September, about 2,500—3,000 specimens each month. The composition of the landings has changed since 1932, smaller sizes now constituting a greater part. A preliminary paper on the results has been published (12). A further report by Aage J. C. Jensen will be found in the Appendix. (This Volume part 3).

A paper dealing with the problem of the best size limit from the economical point of view has

been published (11). In this paper, the argument is based on purely practical considerations, taking into account the average size composition of the stock as influenced by the rate of depletion by fishery, and emigration from the nursery grounds, and the value of live and iced plaice of different size categories. There are some indications, though not at present conclusive, that a 27 cm. size limit, if introduced internationally, would give good results economically.

England.

The collection of otoliths of each trade category of plaice was continued at Lowestoft and Grimsby. The following number of fish were measured, weighed and otolithed (see Tab. I):

In addition, a daily collection of the number of cwt. landed of each trade category which had previously only been made at Lowestoft was also instituted at Grimsby.

The 1934 material has been computed (with exception of December) and the percentage nu of each age-group, shown in Table II, may be com with those for 1931 to 1933 given in the pre reports (Rapp. Proc. Verb., Vol. LXXXV, 2ème p p. 43, 1933, and LXXXIX, 2ème partie, p. 44, 1 The December figures for 1933 which were not for press last year are added. (Tab. II):

The 1928 year-class both as the V and VI age-g continued to predominate at both ports, th inevitably its importance has gradually declin its numbers are reduced by fishing. With rega the next two succeeding year-classes, there marked difference between the Lowestoft Grimsby landings. With one insignificant exce the percentage of the 1930 year-class both in th and IV age-groups has shown a higher perce than the 1929 year-class in the IV and V age-g respectively at Grimsby. In the Lowestoft lan

Table I.

Number of Plaice measured, weighed and otolithed.

Lowestoft

1934	Dead Small	Small	Best Small	Small Medium	Best Medium	Slabs, Large & Best
April	658	419	475	68	67	67
July	553	395	426	148	112	62
October	531	341	337	68	55	59
December	475	312	357	121	101	64
Total...	2,217	1,467	1,595	405	335	252

Grimsby

1934	Chats	Small	Big Small	Middles	Best Medium	Large Best	Large
March	557	475	415	361	190	136	109
June	535	527	384	334	192	150	100
September	496	450	420	323	164	137	97
December							
Total...							

Table II.

Percentage numbers of Plaice landed in each Age-Group at Lowestoft and Grimsby in cer Months of 1934.

Port	Date		Age-Group I	II	III	IV	V	VI	VII	VIII	IX	X	X
		Year of birth	1932	1931	1930	1929	1928	1927	1926	1925	1924	1923	19
Grimsby	Dec. 1933	Percentage		1.1	13.8	14.4	46.7	10.0	3.2	3.4	1.7	0.9	
Lowestoft	Dec. 1933	—		1.9	12.5	17.6	52.8	7.5	2.6	1.5	0.9	0.7	
Grimsby	Mar. 1934	—	0.3	5.0	21.1	17.5	37.4	8.1	3.7	3.1	1.1	0.7	
		Year of birth		1932	1931	1930	1929	1928	1927	1926	1925	1924	19
Lowestoft	April 1934	Percentage		0.5	6.7	20.7	22.3	43.3	3.7	1.1	0.6	0.2	
Grimsby	June 1934	—		3.9	11.1	28.7	14.7	32.7	3.3	1.5	1.2	0.7	
Lowestoft	July 1934	—		0.2	6.9	29.0	24.6	35.8	1.7	0.4	0.4	0.2	
Grimsby	Sept. 1934	—		28.4	7.6	12.3	11.6	29.7	4.6	1.4	1.0	0.9	
Lowestoft	Oct. 1934	—		0.2	7.9	23.8	27.2	38.0	1.2	0.5	0.2	0.2	

rse has always been the case. An examination lata as to the relative abundance of the two sses as judged by the landings per 100 hours' does not yield very satisfactory results, as e is confused by the effect of the imposition nimum size limit in the latter part of 1933. whole, however, the 1930 year-class appears been more abundant than that of 1929 on unds fished by the Grimsby vessels and the ar-class the stronger in the areas worked from ft.

ny.

survey of the stocks of plaice in the German vas carried out to a lesser degree in 1934 than preceding years. The M/S "Augusta" was l in this work on four sections in the inner n Bight during May-June and in the vicinity goland during July and September. About age-determinations were made. In the spring ice catches were strikingly small in the area stigation, but a reliable comparison regarding bundance with those of the "Poseidon"- of previous years cannot be made. It was, r, ascertained, in spring as well as in summer, e percentage of the rich year-class 1928 had ly strongly diminished. This is most probably art from fishery, to a strong migration (perhaps maturity of the majority of these plaice) the young plaice grounds. Since the density population is so small, we may not infer a strength of the younger year-classes from elatively high percentage in the catches, but ar-class 1932 is evidently stronger than that of especially in the sub-region off the east-Frisian and the year-class 1933 was caught everywhere derate numbers.

eport on the plaice population of the German in 1933 has been published (1). Further, a short on the results of the investigations on young in the German waddensea during the years -1930 has appeared (5).

le surveying the plaice landings of the German ea cutters in Hamburg/Altona and Wesermünde age determinations were made. In the landings year 1934 the 6-year-old plaice of the year-class till predominated, but their percentage decreased quickly towards autumn and was in places y surpassed by younger year-classes. In autumn, shery followed the emigrating old fishes extra- rily far out into the sea. The introduction of inimum size caused a very rigorous selection of table plaice: in some landings the smallest had a length of 26 cm. After the emigration of ar-class 1928 the prospects of the plaice fishery German Bight are no longer as favourable as were before.

o reports on the plaice landings of German s and the productiveness of the plaice fishery been published, as well as some papers on the purpose of the investigations in the markets (16—18).

Holland.

In order to survey the plaice population off the Dutch coast 11 stations on 3 sections were fished in May, and about 3550 age-determinations were made. In this region a marked reduction of the year-class 1928 had already been noticed in the previous year, and now it comprises only a very unimportant part of the whole stock, just as the year-class 1929, which is decidedly poor here. But the year-class 1930, which constituted almost half of the population in the previous year and which must be called comparatively rich, has also considerably decreased numerically as IV-group. It is already surpassed, though only slightly, by the year-class 1931, group III, which constitutes 23 % of the population. It is the year-class 1932 (group II) which outweighs all others, constituting as it does almost 49 % of the total plaice population; (this same year-class is also comparatively strong in the neighbouring sub-region of the east-Frisian coast). Marketable plaice of 25 cm. or more were strikingly rare. It is not impossible, however, that the bulk of the older plaice had emigrated seawards when the investigations were made.

As in previous years, the material was put at the disposal of the Biological Institute of Helgoland for further treatment. A paper dealing with the plaice population of the region off the Dutch coast, as compared with that of the German Bight, is published in part 3 of this volume, App. 10.

On the fish market of Ijmuiden the market measurements of the various commercial categories of the plaice were continued as far as other work permitted.

2. Rate of Growth.

Denmark.

In the southern Horns Reef Area (June 1934) the average length of the age-groups II and III (year-classes 1932 and 1931 respectively) seems to have been a little above those of the same age-groups during 1925—30, and the lengths of the age-groups IV, V, and VI (year-classes 1930, 1929 and 1928) somewhat below. A comparison is to some extent unreliable because of the difference in the seasons of fishing in 1934 and in previous years, and the different distribution of plaice resulting therefrom.

Germany.

Because of the occurrence of several poor year-classes in the years 1929—31, it had been expected that the growth increase, which had already manifested itself clearly in 1933, would continue. The spring investigations showed that the average lengths of the age-groups were almost the same as those of the preceding year in the same region. A comparison of the summer and autumn investigations, on the other hand, shows a distinct increase of the length-averages for the age-groups II—IV.

Holland.

The length averages of the plaice in the region off the Dutch coast are consistently higher than in the German Bight; compared with those of the preceding year the age-groups II—V show a small decrease; as far as the II-group is concerned, the length of which has been found to fluctuate largely also already in previous years, the decrease is specially noticeable in the region of the west-Frisian isles.

3/4. Marking and Transplantation Experiments.

Denmark.

The marking experiments carried out in 1932 and 1933 were continued in April, 1934. A total of 750 plaice were marked and liberated. A batch of plaice was liberated at Graadyb off Esbjerg; of these about 50 % were recaptured during the following half year. Emigration, especially of the year-class 1928, to the open North Sea, was more pronounced than in the previous years. Three samples, each of about 200 specimens, were transplanted to three localities on the northern border of the Dogger bank. The transplantation has been successful as far as it is possible to judge up to the present. A pronounced southerly migration was seen in the following months. 79 % of the recaptures were made by Danish seiners i. e. very nearly the same proportion as in the previous experiments carried out on the Dogger Bank in 1932 and 1933. Of the rest English fishermen have taken 20 %, Dutch fishermann 1 %. The growth on the Dogger Bank has been good as usual, up to 10 cm. in the course of five months (in the Horns Reef area 2—3 cm. only).

England.

No marking experiments have been made during the year. But the material in hand is now being worked up.

5. Eggs and Larvae.

England.

The collection of plaice eggs and larvae on light vessels is being continued (See B. III. 4). A programme of plaice egg cruises has been arranged.

Germany.

During a cruise of the patrol-boat "Elbe" in November-December advantage was taken to collect plaice eggs in the Hoofden and the eastern Channel.

6. Racial Investigations.

Racial investigations were carried out on the Horns Reef plaice during the transplantations in April and from "Dana" in June.

V. Other Fish.

Belgium.

Sprat. The investigations of the preceding years have been continued. One kg. of samples have taken from each of the landings throughout the se In these samples, the mixture of sprats and y herrings, size, age (from scales), state of gonads and content of stomachs of the sprats have bee certained.

Denmark.

Dab and Sole. Material for determining the of other fishes, especially dab and sole caugh "Dana" in the Horns Reef area has been colle but not yet been worked up.

All material of species other than those menti above has been measured and registered.

England.

Sprat. The year 1934 is taken to include the la half of the 1933/34 fishing season and the first of the season 1934/35.

During both seasons routine observations on length and sexual maturity have been made on sprat shoals of the east and south coasts of Engl As in previous seasons, the chief year-gr represented in the catches of 1933/34, were I, II III. The two latter groups still appeared to relatively more important than they were in 192 and 1930/31. On the other hand their incidence se to correspond more closely to the appearance of t groups in 1931/32 and 1932/33.

The material for the beginning of the season 193 has not yet been examined.

The M.V. "Onaway" has been engaged in t with experimental sprat drift nets of eight diffe mesh sizes, ranging from 57 to 90 rows per y These trials have not been attended by good fort The results, as far as they go, seem to show that most successful fishing results from the use of approximating to the commercial size of mesh rows per yard).

During the current season, 1934/35, a type of s trawl, originating at Poole on the south coast, been tried off Southwold on the east coast, but so far failed to make satisfactory catches, althou is highly successful in its home waters.

Owing to the fact that the sprat drift nets on the east coast, "swim" wholly unattached to vessel, it has been proved possible conceivably the first time for a single vessel to fish both nets and a trawl simultaneously on the same gro This has twice been accomplished successfully M.V. "Onaway" in shallow water, close inshore, Southwold. Sprats were caught in fair quantity the middle of the drift net to the foot, but ne in the head of the net, nor in the sprat trawl o bottom. (The depth of the drift nets is about $2^1/_2$ From this it may be asserted with some confi that the sprats were at that time swimming in water only, and their vertical distribution was accurately determined within certain limits.

In 1933/34 fat determinations were carried out

samples of sprats. The fat percentage declined bout 14—15 % in November 1933 to about March 1934. The extremely rapid drop in fat t previously noted in December to January 3 was not repeated. Fat determinations have ontinued from October 1934, resulting in values —13 % of fat up to January 1935.
e stomach samples have also been collected the later months of 1934, as in previous seasons.

e.

mensurations étaient faites au cours des sorties débarquement du poisson à Boulogne, regardant quereau, le merlan et la sardine.
observations sur les sprats pêchés dans la zone étaient continuées.

nany.

chovy. Eggs having been observed in unusual ers off Helgoland in June, catches with the g trawl north of Helgoland gave, in the ning of September, considerable numbers of anchovies, of which the largest had already ed a length of 8 cm., and a number of anchovy in the stage of metamorphosis.
ckerel. In August 1934 an unusually large number of small mackerels were caught off Helgoland. Material for age determinations was taken from some small samples.

Sole. The sole investigations in the German Bight were carried on in the usual way. Out of 33 soles marked experimentally off Helgoland at the end of September, 1933, 8 individuals (24 %) were recaptured up to the end of September, 1934; both as regards time and place these markings had been made so as to ensure the least possible number of recaptures immediately upon liberation, and consequently the result may be called satisfactory. The material is too small to permit of principal conclusions. In essence, however, the ideas of the growth and the migrations of the sole, formed on the basis of other investigations, were confirmed.

A report on the observations regarding the sole collected in Helgoland has been published. The following statements are noteworthy: 1) that the sole is of steadily growing importance for the fishery in the North Sea, 2) that the sole fishery has increased in intensity, and 3) that the effects of the fishery can already be traced in the stock of sole (2, 3).

Sprat. Together with the experiments to ascertain the distribution of young herrings, occasional observations were carried out concerning the length, age, maturity and stomach contents of sprats.

C. SHELLFISH

nany.

ster. The rearing experiments in the laboratory lgoland have been carried on; the water-passage gh the basins was enlarged. The first set of spat e year was heavily injured through the enormous rence of the diatom *Sceletonema costatum*, and the iments could be continued only after a thorough sing of the whole establishment. Fixing was then ed. The aquaria were enlarged and the experiments continued. A detailed description of the spat of *Ostrea edulis* and of its development from the extrusion from the parental animal to the state of fixing has been published (8).

Lobster. The scientific investigations into the casting and the colouring of artificially reared lobsters have been continued, the observations extending now to the 26th/27th stage of casting, age $4^1/_2$ years. A report is under preparation.

D. BENTHOS AND DEPOSITS

mark.

e investigation of the disease in the eel grass, *ra marina*, in the Limfjord has been continued.
also Transition Area).
vestigations on the bottom Fauna in the Ringing Fjord were carried out in Jan. 1934, with Petersen grab. After the opening of the sluice s at Hvide Sande in 1932, the water in this fjord a salinity varying between 7 and 22 ‰, but it is tly keeping on a low level. The bottom was found red with huge quantities of *Mya arenaria* which discovered to be a favourite food of the flounder.
work on the fauna of the Ringkjøbing Fjord in brackish water period 1915—1931, edited by Blegvad and R. Spärck, will be published shortly.
ottom samples have been taken in the Horns Reef at each of the trawling stations with the Petersen grab (0.2 m.²). At 20 of the stations samples were taken with the Knudsen bottom sampler, which proved to be very effective in various localities.

Various biological and physiographical investigations have been carried out by the Skalling Laboratory off Esbjerg ("Institut for Klit-, Marsk- og Vadeforskning" founded by the Carlsberg Fund; working since 1930. Leader Dr. Niels Nielsen). Biological investigations in 1934: a quantitative and biological investigation of the fauna in the Waddensea of Ho Bay (H. and E. Thamdrup); experiments on metabolism, resistance to unfavourable factors etc. in different waddensea animals (H. Thamdrup); biological investigations of *Bledius*, *Dyschirius*, *Heterocerus* etc. in the waddensea shores (Ellinor Bro-Larsen); food and growth in young stages of *Macoma baltica* and *Cardium edule* (Hj. Ussing); plankton

investigations in the Ho Bay; botanical investigations in the waddensea and marsh-land. — Physiographical investigations in 1934: growth of the marsh-land (Dr. NIELS NIELSEN); general sediment-petrographical investigations of the Ho Bay (Dr. NIELS NIELSEN and H. THAMDRUP); measurements of currents, salinity, temperature and water level in the Ho Bay (H. THAMDRUP). Several publications are in preparation.

Germany.

Quantitative investigations into the bottom fauna by means of the Petersen grab have been continued off Helgoland. In the waddensea, off List, the ecological investigations into the tidal zone have been further supplemented. It is remarkable that a heavy spatfall occurred (especially of *Macoma baltica* and *Cardium edule*) during the summer of 1934, while the spatfall had been small in the preceding years.

The observations concerning the disease of the eel grass and its results have been continued; a re on this question will appear in due course. In fall of 1934 the eel grass meadow near List on was found to be completely destroyed. Green leaves were almost entirely wanting, and many the *rhizomes* washed out of the ground, wh had no longer been sheltered against the sea by leaves. Certain animals of the *endobiosis* of *Zostera* community were found to be destroyed numbers. (e. g. *Lanice*).

A scientist from the Biological Institute had opportunity of visiting the Danish research stat at Skallingen in order to study the research meth there developed. On the basis of their investigati in the tidal region the Biologische Anstalt operated with the Department for the reclaiming land in so far as the study of the influence of genetic factors and their practical exploitation concerned.

E. PLANKTON

Belgium.

Weekly vertical plankton hauls have been made on the West Hinder light vessel. Laboratory work on plankton has been carried out.

England.

Intensive plankton investigations were carried out during 1934. Ten cruises of the Research Steamer "George Bligh" and eleven of the motor drifter "Onaway" were made during the year.

The scheme of work included:

1. Investigations on the ether-soluble matter of dried plankton: a) along the whole east coast area (June and October); b) monthly observations at six stations between Flamborough Head and the South West Patch of the Dogger Bank (Jan.—Dec.).

2. Plankton of northern grounds (Great Fisher Bank etc.) in connection with herring food investigations (May).

3. Investigations into the relation between abundance of plankton and hydrological conditions (monthly observations from May to September).

4. Relation between Phytoplankton concentrations and the shoaling of herring (October and November).

1) The sampling of dried plankton for ether soluble matter continued over the same area as was investigated in 1933. The values found along the English coast in June and October were generally similar in distribution to those of the year before, except that the high values in the southern half of the area in October were nearer to the English coast in 1934.

In the Flamborough line area the spring and autumn fat maxima behaved in the same way as in 1933; beginning off-shore and extending in-shore. On the whole fat values reached higher levels in 1933 than in 1934. Nearly pure samples of *Phaeocystis* sp. and *Beroë cucumis* gave 2.5 and 4.5 % ether soluble matter to dry weight.

2) Observations on the stage, length, sex and feeding of *Calanus finmarchicus*, *Sagitta setosa* and *S. elegans* have been commenced on the monthly stations mentioned in connection with the ether solu assessments.

3) The investigations under heading 3 were o preliminary nature, intended as the first of a se to be continued for several years. The provisio results obtained are very promising. The plank collected on the five cruises devoted to this w enabled us to follow the distribution of the diat *Rhizosolenia styliformis* on the western side of southern North Sea during the period from May September.

4) The work under heading 4 was handicapped the breakdown of the "George Bligh" at the end October, after two short cruises had been made the purpose of charting phytoplankton concentrati in the southern North Sea. The work was contin during November by short cruises of the motor ves The two diatoms *Rhizosolenia styliformis* and *Bid phia sinensis* were again widespread, but the conc trations were not so dense as in 1933. *Rhizosole* was principally found north of Smiths Knoll L while *Biddulphia* extended across almost the wh of the Southern Bight, being partially divided i two by the tongue of salter water from the Chan Thus for the second year in succession, *Biddulp sinensis* was found in abundance on the English of the Southern Bight and it will be interesting see if it established itself there. (It was also repo as abundant in the Thames Estuary in October early November, along with a few *Rh. styliform* Prof. HARDY of Hull University cooperated with Lowestoft Laboratory in this work. (See below)

A report on the phytoplankton investigations f 1921—1932 has been published during the year (

Germany.

A report on the distribution of macroplankto the south-western North Sea and in the entranc the Channel was published in November—Decem 1933 (28). On a cruise of the fishery patrol "Weser" into the region of the driftnet herring fis

erbank and Smiths Knoll area) in October—
mber, 1934, the distribution of the larger forms
nkton was studied by means of vertical hauls
he "Helgoland larvae net". A detailed treatment
results is not yet available. Work was carried
ith the same net on board the fishery patrol boat
" in the south-western North Sea and in the
nce of the Channel in November—December.
distribution of the species tended to indicate a
aching mixing of the watermasses of the area,
he Eastanglian coastal current, the Doggerbank
the Flemish coastal water, and the Channel
nt. Judging from the distribution and density
e form *Turritopsis polycirrha* the influence of
hannel water was much stronger in the Hoofden
ovember—December, 1934, than during the
season in 1933.

e macroplankton in the neighbourhood of Helgo-
was studied. Unusual occurrences were not found.
e morphological characteristics and differences of
s of the Leptomedusa *Helgicirrha Schulzii* and
e viridula were studied and described (13).

report on the catches of surface plankton taken
g the cruises of the "Poseidon" in May, 1933
man Bight) and of the fishery patrol boat "Weser"
fden and eastern part of the English Channel)
been published (27/28).

both cases the distribution of plankton com-
ties was studied jointly with the hydrographical
ition, as Professor MIELCK had done during these
es. These investigations will be carried out in
e more intensely than formerly, since they
the hydrographical condition of the area under
vation more easily comprehensible to us.

e investigations in May (German Bight) showed,
e region from the Hever up to the north-west
ylt, a large area of the "coastal water" (much
tus and *Biddulphia rhombus*), extended by the
ixture of Elbe water flowing towards north-
. South of Helgoland this coastal water is of no
rtance, as in these quarters a flow of more saline
erly water (maxima of Chaetoceras species)
rudes eastwards.

zone of "mixed water" characterized by a rather
development of *Guinardia flaccida* consequently
to be found just outside the east-Frisian isles, while
same formation off the coast of Schleswig-Holstein
found farther out to sea. In the Graa-Dyb-section
he north the occurrence of *Ptychocylis urnula*
ved clearly the admixture of northerly water, and
he north-west and west, on the 40 m. edge, the
disappearance of phytoplankton indicated the rather more winterly conditions of the water from the middle North Sea. As a mixing product of the last ramifications of these different types of water, a zone of mixed water stretched from the Graa-Dyb-section to Helgoland, between about 7° and 7°45′0 L., populated by various small species of *Peridinium*.

Whether there exists a connection between the localisation of *Phaeocystis maxima* and the distribution of young herring cannot be decided from the material at hand.

In the Hoofden (Nov./Dec., 1933) the distribution of the water types could be easily judged from the surface plankton and it served to elucidate the question as to the origin of the young herring larvae. The well-known southerly boundary of the occurrence of *Rhizosolenia styliformis* and *Ceratium longipes* and *tripos* (about 52°50′ Lat. N.) was clearly defined, and specially so was the region of the east-Anglian coastal current (much detritus, further *Biddulphia mobiliensis* and as the characteristic form of northern waters *Ptychocylis urnula* up to the Thames estuary) which carries larger herring larvae transported from the north.

Numerous surface plankton catches were also collected from the research cruises of the fishery patrol boats "Weser" (Oct.—Nov., 1934, to the Doggerbank and northern part of the Hoofden) and "Elbe" (Nov.—Dec., 1934, Hoofden and eastern part of the English Channel) which will be worked up together with the material of the "Poseidon"-cruise in January into the same region. It is, however, worth mentioning at once that Acantharians were ascertained in the middle and northern part of the Hoofden; their occurrence here is extremely rare.

In January, 1934, the daily observation of microplankton was again resumed from Helgoland. This work was supplemented by plankton catches from the inner German Bight taken by the "Augusta" while commissioned for other investigations, in order to study more closely the change of plankton and currents around Helgoland.

Scotland.

The plankton conditions at the May cruise of the "Explorer" were more or less normal. Small medusae, chiefly *Obelia*, and the arrow-warm *Sagitta* were numerous. *Calanus* and Decapod larvae occurred in nearly all the hauls, but never in abundance.

During August, the plankton catches were rich in species and in actual numbers. *Calanus*, *Sagitta* and *Beroë* were common over the whole area.

F. HYDROGRAPHY

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Summary of 1934-cruises.

Belgium.

S/S "Victoire"; Prof. G. Gilson; Jan., Mar., Apr.: Belgian and French coast: trawling and dredging.

S/S "Zinnia"; Prof. G. Gilson and Mr. C. Gilis; Jan.: fish larvae; Febr.-May and Sept.-Nov.: special net-towing for bottom fauna; Dec.: herring.

Denmark.

S/S "Dana"; Dr. Tåning; Apr. and June: as Northern North Sea.

England.

S/S "George Bligh"; Apr.-May: test of trawls (F. M. Davis); Aug.: trawling (Wollaston and Graham).

S/S "Onaway"; Febr.: Channel and S. Bight; sprat (Robertson and Wimpenny); June-Aug.: Shields area: herring (W. C. Hodgson); Oct.: S. Bight: sprat (J. A. Robertson). Commissioned from Jan. 13th—Nov. 30th.

France.

S/S "Président Théodore Tissier"; Dr. le Dano May — en route — herring, mackerel, hake.

Germany.

M/S "Augusta": Jan. 23rd—May 11th: Heligola Elbe-Jade: herring larvae (Dr. Bückmann or Holtmann); May 12th—Sept. 28th: German Big plaice, sole, young herring (Bückmann, Hagmei Holtmann or Wulff); Oct. 1st—Dec. 18th: In German Bight: valuation (Holtmann).

S/S "Elbe"; Dr. Bückmann; Nov. 8th—Dec. 14 Flemish Bight and E. Channel: herring larvae a fish fry.

S/S "Weser"; Dr. Bückmann; Oct. 2nd—Nov. 5 Doggerbank — Flamborough head — N. German Big herring larvae.

Holland.

H.M.S. "Nautilus"; Dr. Tesch; May 14th—18 plaice invest.

TRANSITION AREA COMMITTEE

1934.

Dr. H. Blegvad.

Denmark.

Biology (Dr. H. Blegvad).

vessels used for the research work were: /S "Biologen" (April—October) and a motor- (July—August).

ice Investigations. Fishing experiments with the " (a fine meshed otter seine) were — as in former — carried out throughout the Transition Area the Skagerak to Bornholm.

e year-class 1932 (II-Gr.) was found to be very both in the Kattegat, in the Belt Sea and in in parts of the Western Baltic. This coincides with the fact that this year-class was found to ceedingly rich both as 0-Gr. in 1932 and as I-Gr. 33. By far the main part of the unusually large of the plaice fishery in the Kattegat and the Sea during the latter part of the year 1934 was to this year-class having now reached a mean h of about 30 cm.

ong the coasts fishing was carried out from a r-boat with Johansen's young plaice trawl in the ner months in order to investigate the strength e 0-Gr. of the plaice (see Fig. 1). The 0-Gr. was d to be exceedingly rich throughout the whole of Transition Area (except only parts of the Great and the North Coast of Sealand), even richer than)-Gr. in the good survival year 1932. In the waters nd Bornholm and off Rügen the 0-Gr. was edingly rich. (See Baltic Area Report, Denmark on p. 55).

he transplantations of undersized plaice from the th Sea to the inner Danish waters were continued, 670 kg. or about 1,317,750 individuals being splanted to the Belt Sea, the Southern Kattegat, Sound and the Western Baltic during the month pril. According to investigations (marking experi- ts and stock analyses) carried out, the same good lts seem to have been obtained as in former years.

he transplantations of plaice to the inner part of Limfjord has been continued, and in all 128,552 kg. 1,538,700 individuals were transplanted.

rom the North Sea off Thyborøn ca. 2000 kg. of ce were transplanted to the waters round Læsø Kattegat). In order to check the result of this eriment 100 individuals were marked.

Other Flatfish. Investigations as to the biology of the other flatfish (especially Flounder and Dab) have been carried out in continuation of previous years' research work. In certain parts of the Northern Belt Sea the 0-Gr. of the sole was found to be far more numerously represented than in former years.

Cod and other Gadidae. By means of ring-trawl fishing in the spring it was observed that the amount of fry of cod and other gadidae were somewhat above normal. The fishing with the "Tog" showed that the II-Gr. of the cod and of the whiting were very rich, in good agreement with the rich occurrence of the 0-Gr. of these specimens in 1932. In the western part of the Belt Sea and in the Sound the II-Gr. of the coalfish was caught in commercial fishing gears in rather large numbers, also in agreement with the occurrence of a rich 0-Gr. in 1932.

Herring. The location of spawning places was carried out in the autumn in the Southern Kattegat, the Belt Sea and the Baltic (Figs. 3 and 4). The amount of fry was — as in the previous year — somewhat below normal. The yield of the autumn fishing for herring was far below normal.

The investigations of the amount of fry available for the herring in the Baltic round Bornholm have been continued in co-operation with the Plankton Laboratory (Dr. P. Jespersen).

Mackerel and Eel. Forecasts of the yield of the fishery were published in "Dansk Fiskeritidende" and in "Ny svensk Fiskeritidskrift" (by Aa. J. C. Jensen).

Larvae of Spring Spawning Fishes. During April, May and June fishing experiments with the ring-trawl were carried out throughout the area. On the whole the number of larvae found was somewhat above normal; this holds good especially for plaice and cod, in agreement with the rich occurrence of the bottom stages of the 0-Gr. of these fish later on during the summer.

Anchovy. This fish is only a rare visitor to the Transition Area. It was, however, observed here in rather large quantities in different places, e. g. in Sejrøbugten (up to 25 kg. pr. pound net per night) and in Aarhusbugten. Specimens from the first-mentioned place were investigated in July, their mean length was about 16 cm. and the majority of the specimens had running roe and milt. The few scales

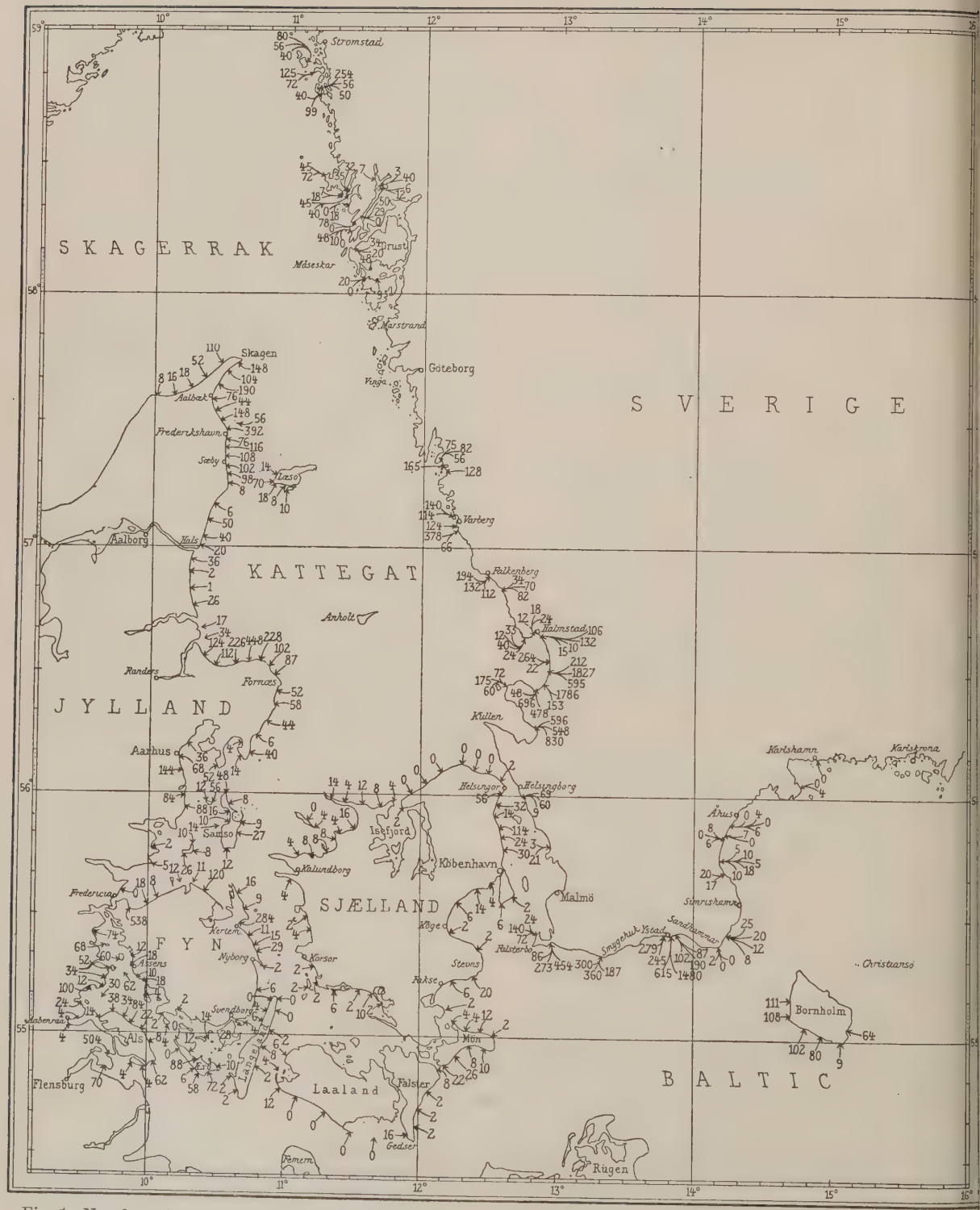


Fig. 1. Number of plaice of the 0-Group (year-class 1934) taken per fishing unit in the summer and autumn of 1934. The fishing unit used was a 30 minutes' haul with Johansen's young plaice trawl.

g. 2. Number of plaice of the I-Group (year-class 1933) taken per fishing unit in the summer and autumn of 1934. The fishing unit used was a 30 minutes' haul with Johansen's young plaice trawl.

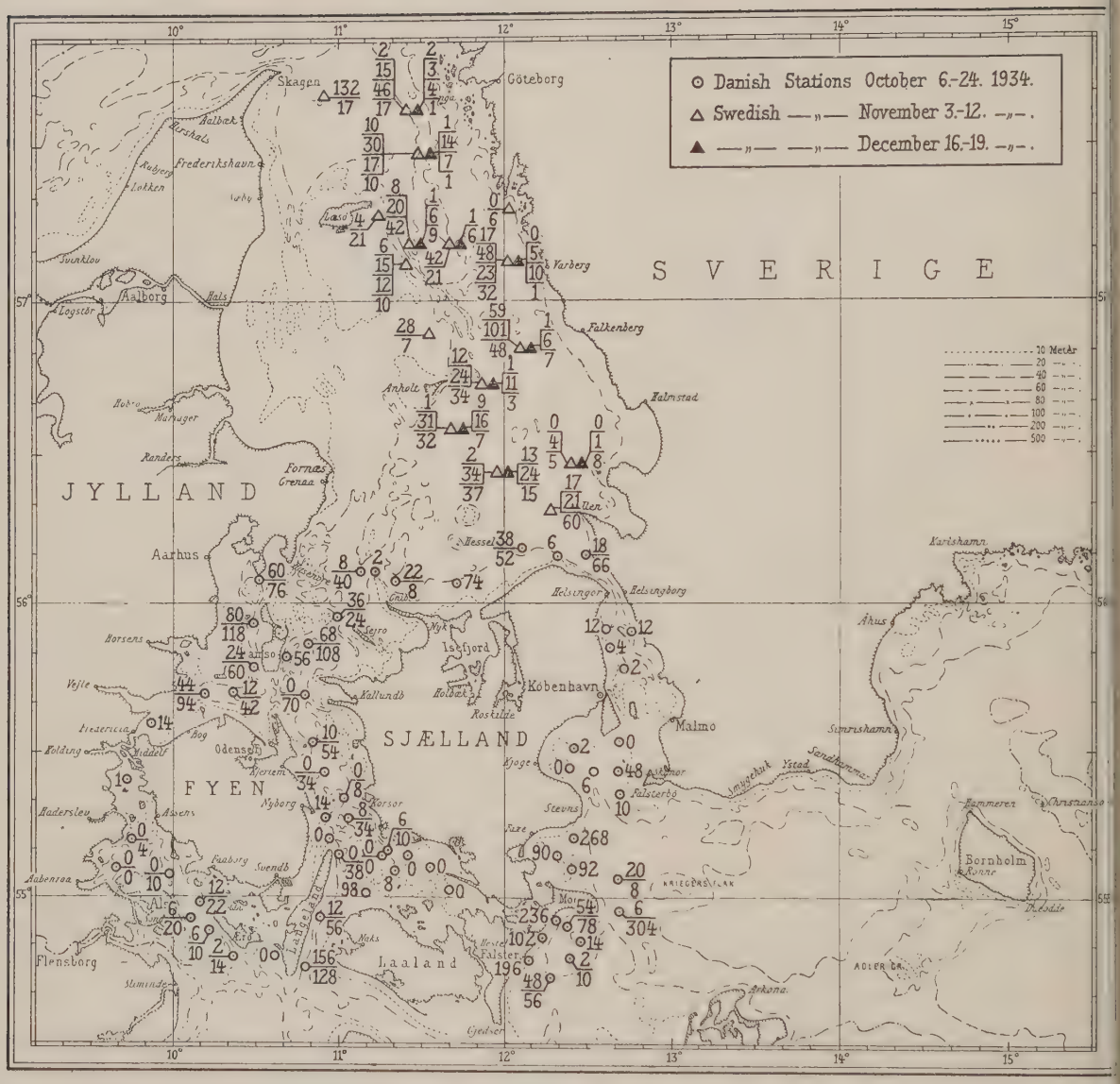


Fig. 3. Total number of herring larvae taken per 30 minutes' haul with a 2 metres stramin ring trawl in the autu of 1934. — Where more than one figure is given at one station, the upper figure indicates catch in the upper layer (0– metres depth), the lower figure catch at the bottom, and figures between the lines catch in the intermediate water lay

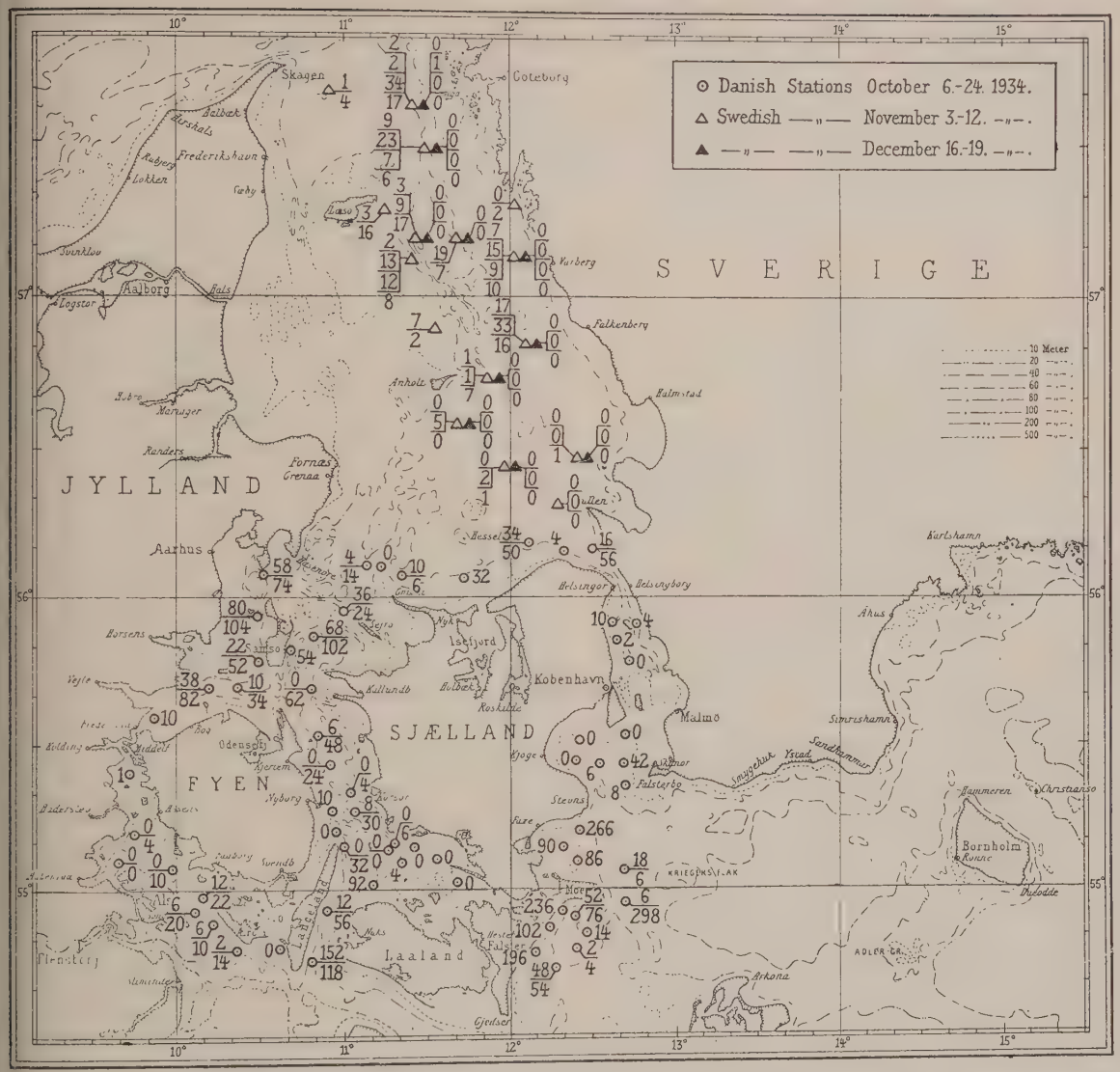
which could be obtained from the fish showed 2 winter-rings.

Norwegian Prawn. During later years a comparatively important fishing on the Norwegian Prawn (*Pandalus borealis*) has been carried out in the Skagerak off Hirshals and Skagen at a depth of 100—200 metres; the yearly yield of this fishing amounts to ca. 50,000 kg. Measurements of the prawns made from the "Biologen" showed that the commercial fishing utilises only the largest individuals of the stock.

Bottom Invertebrates. As in former years, vall tions of the bottom with the Petersen grab have b undertaken throughout the Area.

Plankton. Vertical hauls with the plankton net fine gauze and with the Hensen net have — as former years — been carried out from various lig vessels in the Kattegat and the Belt Sea.

Vertical hauls with the Hensen net have been m in connection with the ring-trawl fishing during spr and autumn.


Danish Stations October 6.-24. 1934.
Swedish —„— November 3.-12. —„—.
—„— —„— December 16.-19. —„—.
SVERIGE
JYLLAND
FYEN
SJÆLLAND
Laaland
Skagen
Göteborg
Varberg
Falkenberg
Halmstad
Aalborg
Aarhus
Randers
Anholt
Hesselø
Helsingør
Helsingborg
Kobenhavn
Malmø
Ystad
Falsterbo
Stevns
Bornholm
Rønne
Christiansø
Hammeren
Simrishamn
Ahus
Kristianopel
Arkona
Gedser
Nyborg
Svendborg
Odense
Middelfart
Esbjerg
Ribe
Hirtshals
Frederikshavn
Lökken
Hals
Logstør
Fornæs
Grenaa
Kalundb
Roskilde
Kalundborg
Korsør
Slagelse
Nakskov
Maribo
Sandhammn
Kristianopel
Ærø
Als
Alsen
Flensburg
Apenrade
Hadersleben
Veile
Horsens
Aabenraa
Tønder
Esbjerg
Ribe
Varde
Skjern
Holstebro
Thisted
Hanstholm
Skagen
Hirtshals
Frederikshavn
Aalborg
Aarhus
Randers
Grenaa
Anholt
Hesselø
Helsingør
Kobenhavn
Malmø
Ystad
Falsterbo
Stevns
Bornholm
Rønne
Christiansø
Hammeren
Simrishamn
Ahus
Kristianopel
Arkona
Gedser
Nyborg
Svendborg
Odense
Middelfart

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Germany.

Deutsche wissenschaftliche Kommission für Meeresforschung Ostsee-Abteilung Hamburg.

Von S. Strodtmann.

Im Jahre 1934 wurden lediglich einige Untersuchungen mit einem Fischkutter ausgeführt, und zwar im April zur Beschaffung von laichenden Bankflundern der Oderbank für Rassenuntersuchungen und im August und September zur Untersuchung der Jungfischbestände in der Pommerschen Bucht und vor der Küste von Hinterpommern.

Scholle. Im Bericht des Vorjahres wurde eine kurze Mitteilung über einen Verpflanzungsversuch von Schollen aus der eigentlichen Ostsee in die westliche Ostsee gegeben, den wir im April 1933 ausgeführt hatten. Die Ergebnisse haben inzwischen doch ein etwas anderes Bild ergeben als damals gemäss den ersten Wiederfängen mitgeteilt wurde. Vor allem steht das potentielle Wachstum (d. h. die auf inneren Faktoren beruhende höchstmögliche Wachstumsfähigkeit) der Schollen östlich von Rügen dem der Nordsee-Schollen kaum nach. Als höchste Wachstumszunahme haben wir nach $1^1/_4$ Jahr 15 cm., nach $1^3/_4$ Jahr 17 cm., zu verzeichnen. Letztere Scholle hatte in dieser Zeit ihr Gewicht ungefähr versiebenfacht. Die näheren Einzelheiten sind in den Berichten der Deutschen wissenschaftlichen Kommission für Meeresforschung ausgeführt (n. F. Bd. VII Heft 3 und Bd. VII Heft 4).

Die Ergebnisse unserer Rassenuntersuchungen an der Ostsee-Scholle wurden in einer inzwischen veröffentlichten Arbeit von Dr. R. Kändler niedergelegt (Rassenkundliche Untersuchungen an Plattfischen. I. Variabilitätsstudien an den Flossenstrahlen- und Wirbelzahlen der Ostsee-Schollen. Ber. d. W. K. f. M. Bd. VII Heft 4). Darin wird eingehend nachgewiesen, dass der Schollenbestand der eigentlichen Ostsee sich in morphologischer Hinsicht von dem der westlichen Ostsee unterscheidet. Eine sorgfältige Prüfung der Variationsreihen der Analflossenstrahlenzahl nach statistischen Methoden ergab keine Anhaltspunkte dafür, dass Brut und Jungfische aus der Nordsee und dem Kattegat in beträchtlichen Mengen in die Ostsee gelangen. Die Differenzen in den Mittelwerten für Vert. S. und An. zwischen verschiedenen Teilen der Ostsee wie zwischen den Jahrgängen sind nicht durch eine wechselnde Beimischung von Nordsee-Schollen bedingt, sondern haben ihre Ursache wahrscheinlich in regionalen und zeitlichen Unterschied in den hydrographischen Verhältnissen. Für e Veränderlichkeit der mittleren Wirbelzahl spri auch die Feststellung, dass das Auftreten akz sorischer Dornfortsätze an gewissen Wirbeln a Verschmelzung zweier Wirbel zurückzuführen ist. der Häufigkeit der anormalen Wirbel bestehen erhe liche Unterschiede zwischen den verschiedenen Popu tionen. Zieht man nur die Individuen mit norm ausgebildeten Skelett-Elementen in Betracht, so ergi sich für die eigentliche Ostsee eine wesentlich höh Wirbelzahl (43.1) als in der westlichen Ostsee (42 und auch in der Nordsee (43.0). —

Im August und September 1934 glückte es, nic nur bei Sassnitz und auf der Oderbank, sondern au vor der Küste von Hinterpommern bei Kolberg u Stolpmünde, grössere Mengen von Schollen d 0-Gruppe zu fangen. Die Anzahl der in einem Zu von 15 Min. Dauer mit einem Krabbentrawl erhalten Individuen an den verschiedenen Stationen ist a der beigegebenen Kartenskizze zu ersehen. I reichsten Fänge liegen nicht im flachen Wasser unmittelbarer Nähe der Küste, sondern fern v dieser auf verhältnismässig tiefem Wasser. (Ös lich von Sassnitz in 18—22 m., nordwestlich u nördlich von Kolberg in 23 bezw. 30 m. und bei Stol münde in 24 m.). Im flachen Wasser der Oderbar und in Küstennähe (7—11 m.) wurde nur eine gerin Anzahl erbeutet.

Die mittlere Länge der 0-Gruppe war in tiefe Wasser am kleinsten. Anfang August betrug sie O. v Sassnitz in 22 m. Tiefe 45 mm., Ende des Monats b Kolberg in 30 m. sogar 42 mm. Die in flachem Wass gefangenen Schollen waren wesentlich grösser. A der Oderbank bei 7—11 m. massen sie 63 mm.; a der Küste bei 10—11 m. 55 mm.

Aus der Verbreitung und der durchschnittliche Grösse der 0-Gruppe kann man den Schluss ziehe dass die Schollenbrut in den Gewässern östlich v Rügen tatsächlich in tieferem Wasser zum Bode stadium übergeht und sich zunächst hier aufhält, w dies zuerst A. C. Johansen für das Möengebiet nac gewiesen hat und von uns durch Fänge der 0-Grup 1930 östlich von Sassnitz bestätigt wurde.

Die Anfang September 1934 bei Stolpmün gefangenen Schollen der 0-Gruppe waren verhältni mässig gross; sie massen in 11—14 m. Tiefe 63 m im Mittel, in 26—33 m. Tiefe 56 mm. Die Erkläru hierfür ist wohl darin zu suchen, dass die Fangplät innerhalb der der Küste vorgelagerten Bänke liege und die kleinen Schollen bereits von den Aussenhäng der Bänke zugewandert sind.

Aus der Grösse der Fänge und der Ausdehnung d Tiefengebietes von 20—30 m., auf dem sich d 0-Gruppe vornehmlich aufhielt, dürfen wir schliesse dass der Jahrgang 1934 ausserordentlich zah reich vorhanden ist. Für die nächsten Jahre deshalb mit grosser Wahrscheinlichkeit wieder ei Zunahme an Schollen in den Fischereifäng zu erwarten, deren Zahl in den letzten Jahren imm mehr zurückgegangen war.

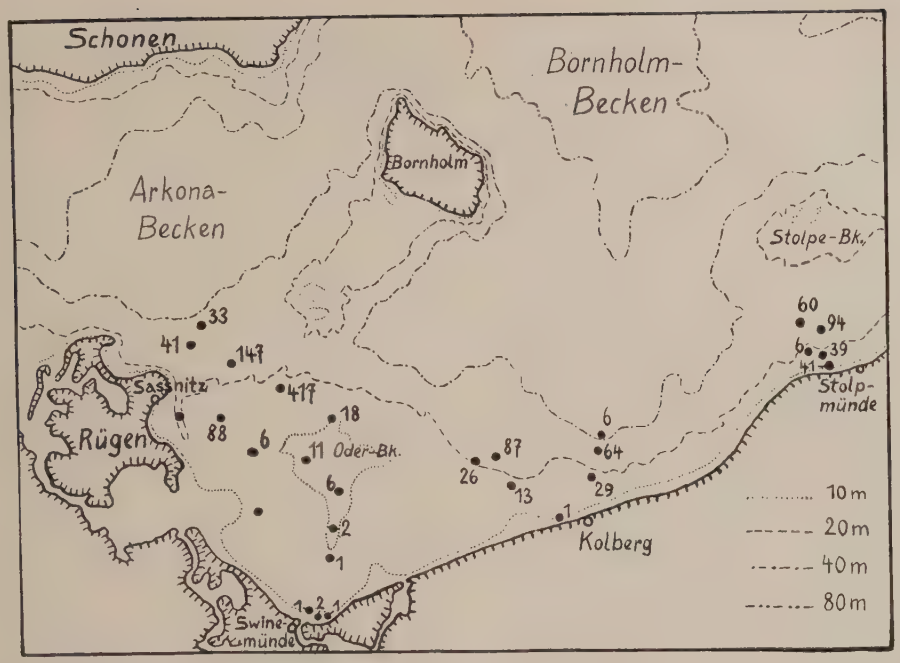


Fig. 5. Fänge von Schollen der 0-Gruppe vor der pommerschen Küste im August—September 1934. Anzahl in 15 Minuten, Krabbentrawl.

e kurze Mitteilung über diese Jungschollenfänge von R. KÄNDLER in der Zeitschrift "Der Fisch-" Jahrgang 1935, Heft 1, gegeben. — merkenswert sind die Befunde über die Nahrung Gruppe in 20—30 m Wassertiefe. Untersuchungen agen- und Darminhaltes ergaben, dass sich die ten gefangenen Tiere — 30—45 mm. — vor- nd von kleinen planktonischen Krebsen nähren. olberg fanden wir den Darmkanal der kleinsten en prallgefüllt mit Cladoceren (*Bosmina mari- Podon evadne*). Diese Formen traten bei den n von Sassnitz gefangenen Schollen zurück, hier hten kleine Copepoden und Mysideen vor. Bei rer Länge — über 50 mm. — und in flacherem r fressen die kleinen Schollen in zunehmendem Bodentiere, kleine Muscheln (*Cardium, Mytilus,* spielen jetzt die Hauptrolle, daneben kleine cken (*Hydrobia*) und Anneliden (*Harmothoë sarsi Pygospio elegans*); Mysideen und Amphipoden n auch jetzt noch gern verzehrt.

vor der pommerschen Küste angetroffenen chollen des Jahrgangs 1934 zeigen die morpholo- en Merkmale der in den tiefen Becken der eigent- Ostsee laichenden Schollen. Da dies von grossem sse ist, seien die Mittelwerte der Analflossen- en- und Wirbelzahl nachstehend angeführt.

Fundort	Vert. S.	Analflossen
ank-Gebiet.....	42.84 ± 0.03	52.02 ± 0.10
rg.....	42.78 ± 0.05	52.37 ± 0.12
münde	42.86 ± 0.04	52.38 ± 0.11

Die hohe Wirbel- und Flossenstrahlenzahl der bei Kolberg und Stolpmünde gefangenen 0-Gruppe, deren Abkunft von den im Bornholm-Becken laichenden Schollen nicht zweifelhaft sein kann, enthebt uns endgültig der Notwendigkeit, gerade beim Auftreten eines reichen Schollenjahrganges in der eigentlichen Ostsee eine besonders starke Einwanderung von Schollenbrut aus den angrenzenden Meeresgebieten annehmen zu müssen.

Die etwa $^1/_2$ Jahr alten kleinen Schollen hatten eine Länge von 3—7 cm. Bei gesonderter Betrachtung der einzelnen Zentimetergruppen ergab sich eine deutliche positive Korrelation zwischen Länge und Wirbelzahl. Zwischen der mittleren Wirbelzahl der kleinsten und der grössten Exemplare besteht eine Differenz von 0.4—0.7, und wir erhalten in einigen Fällen Korrelationskoeffizienten von 0.18 bis 0.27, die mehr als dreimal so gross sind wie ihre mittleren Fehler. Falls diese Korrelation durch Beimischung von Angehörigen der Nordsee-Schollen zu erklären wäre, müssten die grösseren Schollen ausser einer höheren Wirbelzahl auch eine höhere Strahlenzahl der Analflosse haben. Eine entsprechende positive Korrelation vermissen wir jedoch; gelegentlich ist sogar eine geringe negative Korrelation zwischen Länge und Strahlenzahl vorhanden. Die Beziehungen zwischen Länge und Wirbelzahl kann also nicht als Beweis für Zuwanderung von Nordsee-Schollen gewertet werden, sondern muss andere Ursachen haben.

Unter der 0-Gruppe 1934 fanden wir auch eine geringe Anzahl Bastarde zwischen *Pl. platessa* und *flesus* (3.6 %).

Wir setzten unsere Rassenuntersuchungen an Dorsch und Sprott fort, soweit dies durch Fänge an der Küste möglich war. Eine vorläufige Mitteilung über den Dorsch findet sich in den Ber. d. D. W. K. f. M. n. F. Bd. VII Heft 3, S. 303.

Seit Oktober 1934 wird auf Fehmarn Feuerschiff 3 mal monatlich (am 1., 10. und 20.) mit dem Hensenschen Eiernetz auf Fischeier und Larven gefischt. Auch die grösseren Planktontiere sollen berücksichtigt werden.

Über die Arbeiten der Biologischen Anstalt auf Helgoland betreffs Fischeier und Larven der Ostsee gibt Herr Dr. KÜNNE folgende Mitteilung: "Über die Fischbrut- und Planktonuntersuchungen auf der Fahrt des Reichsforschungsdampfers "Poseidon" im Mai/Juni 1931 wurde eine Veröffentlichung fertiggestellt (W. MIELCK† und C. KÜNNE, Fischbrut- und Plankton-Untersuchungen auf dem Reichsforschungsdampfer "Poseidon" in der Ostsee Mai/Juni 1931. Wiss. Meeresunters. n. F. Abt. Helgoland. Im Druck). W. MIELCK behandelt darin die Methodik der Untersuchungen und die Ergebnisse bei den einzelnen Arten der Fischeier und Larven; C. KÜNNE gibt eine allgemeine Darstellung der Ergebnisse über die Fischbrut und die Bearbeitung des übrigen Grossplanktons".

(Summary.)

In 1934 only a few investigations with a fishing boat were carried out: in April to obtain ripe Oder Bank flounders for racial investigation and in August—September for investigating young fish stocks off Pomerania.

Plaice. Subsequent results necessitate a divergence from last year's report, based upon the first recaptures, in respect of the experiment of transplanting plaice from the Baltic proper to the Western Baltic. In particular the potential growth of plaice East of Rügen was hardly less than that of North Sea plaice. The maximum increase in growth after $1^1/_4$ years was 15 cm., and after $1^3/_4$ years 17 cm. The latter fish had in this period increased in weight sevenfold. (For details see Ber. D.W.K., N.F. Bd. VII. H. 3 and Bd. VII. H. 4).

The results of our racial investigations of Baltic plaice have been published in a paper by Dr. R. KÄNDLER (Ber. D.W.K. Bd. VII. H. 4) in which the morphological differences between the plaice of the Baltic proper and of the Western Baltic are set out. A careful statistical examination of the variation series of numbers of anal fin rays offers no grounds for assuming any considerable immigration of fry and young fish from the North Sea and Kattegat into the Baltic, the differences in the average values for Vert. S and An. in Baltic regions being mainly ascribable to regional and seasonal differences in hydrographical conditions. Variability in average vertebral numbers is confirmed by the theory that the appearance of accessory spinal processes on certain vertebrae is ascribable to the fusion of two vertebrae. Different populations show differences in the frequency of abnormalities. For normal specimens on the Baltic proper (43.1) and North Sea (43.0) have considerably higher vertebral number than t Western Baltic plaice (42.8).

In August—September large numbers of plaice the 0-group were captured in various localities (s diagram appended where numbers taken in minute hauls are indicated). The richest catch were in relatively deep water.

The average length of the 0-group was smalle in deep water (beginning of August, Sassnitz 45 mm Kolberg 42 mm.). In shallow waters it was larg (Oder Bank 63 mm., off the coast 45 mm.).

From the distribution and the average size of t 0-group it may be concluded that the plaice-bro east of Rügen passes to the bottom and immediate successive stages in deeper water (A. C. JOHANSE off Möen and 1930 catches of 0-group off Sassnitz

In early September 1934, 0-group plaice taken o Stolpmünde were relatively large (length from 63 56 mm.). The explanation lies doubtless in the fa that the fishing grounds lie inside the coastal ban and the small plaice have already immigrated fro the outer slopes.

From the size of the catches and the extent of th area of 20—30 metres depth preferred by the 0-grou it may be concluded that the 1934 year-class prolific and that richer fishery of plaice may anticipated in the next few years than in latt years.

R. KÄNDLER published a short paper on the young fish catches in "Der Fischmarkt" 1935, H.

The food of the 0-group at 20—30 metres depth noteworthy. The smallest fish examined (30—45 mm had ingested mainly small planktonic crustace either *Cladocera* or Copepods and Mysides. At length of over 50 mm. and in shallower waters sma mussels preponderated together with small snai and *Annelidae* and in addition Mysides and Am phipods.

The young plaice of the 1934 year-class found o the Pomeranian coast show the morphologica characteristics of plaice spawning in the deeper tr Baltic. The average values of the anal fin ray an vertebral numbers may be of interest (see table o page 49).

The high vertebral and fin ray numbers of th 0-group taken off Kolberg and Stolpmünde, whos origin from the plaice spawning in the Bornhol Basin cannot be questioned, relieves us of the necessi of assuming large immigration of brood from neigh bouring sea areas on the occurrence of a rich yea class in the Baltic proper.

Plaice approximately 6 months old had a length 3—7 cm. and special examination of cm. grou showed plain correlation between length and vertebr number; in some cases correlation coefficients we found from 0.18 to 0.27, more than three times large as the average error. This did not appear be due to immigration of North Sea plaice as the was not a corresponding positive correlation betwe

and number of rays. Another cause of relation- between length and vertebral number, other mmigration, must therefore be sought.
ong the 1934 0-group were a few hybrids of *tessa* and *Pl. flesus* (3.6 %).
continued our racial investigation of cod and so far as possible by coastal fishery. A pre- ry report on cod is contained in Ber. D.W.K., Bd. VII. H. 3, page 303.
nery with the Hensen egg-net was carried on times monthly from the Fehmarn Lightship 0th and 20th) for fish eggs and larvae. Attention lso given to larger planktonic fauna.
conjunction with the work of the Biologische lt auf Helgoland a paper by W. Mielck and nne is to be published in the Wiss. Meeresunters. Abt. Helgoland on the fish brood and plankton igation on board the "Poseidon" during May— 1931 in the Baltic.

Von E. Fischer; Berlin.

Beginn des Berichtsjahres wurden zur Hebung Schollenbestandes in der westlichen Ostsee ngreiche Aussetzungen von jungen Nordsee- en durch den Deutschen Seefischerei-Verein e Kieler und Lübecker Bucht vorgenommen. i wurden 2700 Stück markiert, wovon bis Ende Jahres ca. 9 % zurückerhalten wurden. Die flanzten Tiere zeigten sehr erhebliche Längen- Gewichtszunahme. Der verhältnismässig geringe erfang wird auf die geringe Befischungsintensität m Gebiet zurückgeführt.
schon früher ausgedrückte Vermutung, dass den letzten Jahren in der westlichen Ostsee — sondere in der Mecklenburger Bucht — bemerkte nd an *Drepanopsetta platessoides* einem Jahrgang) angehört und dass *Drepanopsetta*-Larven im jahr 1930 in grossen Mengen von der Nordsee ie Ostsee verfrachtet wurden, konnte durch rsuchungen im Jahr 1934 weiter gefestigt werden. igte sich, dass über 80 % der 1934 in der Mecklen- r Bucht gefangenen und am Markt in Warne- le und Travemünde verkauften Scharbzungen Jahrgang 1930 angehörten. Bemerkenswert ferner, dass die *Drepanopsetta*-Anlandungen weit hinter denen des Vorjahres zurückblieben, hl verhältnismässig grössere Tiere gefangen en als die Jahre zuvor. Noch ungeklärt musste tzten Jahr die Frage bleiben, ob der in die Ostse estossene *Drepanopsetta*-Bestand zum Laichen r Ostsee bleibt oder abwandert.
e im Jahr 1933 begonnene Bearbeitung der gie der Ostseekrabbe *Leander adspersus* an der schen Küste wurde fortgesetzt. Insbesondere ten in Bezug auf die Laichperiodizität bemerkens- e Unterschiede gegenüber *Crangon vulgaris* estellt werden.
n bessere Einsicht in die produktionsbiologischen ältnisse in einem bestimmten Fischereigebiet rhalten, wurden umfassende Untersuchungen in der Wismarschen Bucht ausgeführt. Es wurden Bodenuntersuchungen gemacht, die Besiedlungs- dichte der Nährtiere und der Pflanzenbewuchs fest- gestellt. Ferner wurde das Plankton in den ver- schiedenen Jahreszeiten untersucht.

Weitere Untersuchungen, die auf das gesamte Küstengebiet ausgedehnt waren, sind im Bericht des Baltic Area Committee aufgeführt.

(Summary.)

At the beginning of the year under review North Sea Plaice were transplanted by the D.S.V. into the Kiel and Lübeck bays to increase the plaice stock of the Western Baltic. 2,700 were marked, of which about 9 % had been recaptured at the end of the year, the small number being ascribed to lack of intensity in the fishery.

The supposition already expressed that the stock of *Drepanopsetta platessoides* observed in the Western Baltic in latter years belongs to one year-class (1930) and that *Drepanopsetta*-larvae were transported from the North Sea to the Baltic in large numbers in the spring of 1930, received confirmation by investigations in 1934. Over 80 % of those taken in the Gulf of Mecklenburg and sold at Warnemünde and Travemünde belonged to the 1930 year-class. It was also noteworthy that the *Drepanopsetta* landings of 1934 were smaller than those of the previous year although the fish were larger. Last year it still remained a moot point whether the *Drepanopsetta* stock coming into the Baltic remains there for spawning or emigrates.

The study of the Baltic shrimp *Leander adspersus* off the German coast was continued. In particular differences from *Crangon vulgaris* in respect of re- production periodicity were determined.

Comprehensive investigations were made in the Gulf of Wismar to obtain a better conception of the conditions of production biology in a given area. Bottom observations were made, the population density of the food animals and of the plant growth was determined and the plankton was also studied at various seasons.

Further investigations over the whole coastal area are described in the report of the Baltic Area Com- mittee.

Norway.

By Alf Dannevig.

On the part of the Biological Laboratory the following work has been carried out at sea during 1934:

1) Investigations into the hydrography of the Oslo- fjord were made on the following cruises: February 19th—24th, April 3rd—13th and May 28th—30th. — Full stations were made from the Oslo harbour to Færder as also a series of cross sections in the inner Oslofjord were made during the April cruise.

2) Special shrimp investigations were carried out between June 1st and July 18th. Investigations took place at the nursery grounds inside the fjords as well as in the Norwegian Deep from the Oslofjord to Stadt. The occurrence of shrimp was investigated along with the bottom-faune.
3) November 19th—21st trawling experiments were carried out with trawls of various mesh-sizes.
4) Between April 24th—26th the M/C "Morrild" was engaged on transplantation of plaice from Denmark to Helgeroa, Hvaler and Oslofjord; in charge: Mr. P. Bjerkan and Dr. Ruud. The results are not yet available for publication.

Professor Hjort and Dr. Ruud have taken part in the investigations on all cruises, while the hydrography has been in charge of Mr. Alf Klem.

Generally speaking the investigations also included: Oyster-culture, the bottom stages of the cod and lobster fishery, particularly in the fjords. Hauls for fish-eggs and larvae were made in coastal waters simultaneously with the "Skagerak"-hauls in the Skagerak.

Investigations into the eel-question and into the vertebral numbers of various teleosts.

Hatching of cod has been carried out from February 10th to April 16th to the extent of 225.8 millions of fry, all liberated in the fjords of the Skagerak coast.

Rearing of lobster was carried out from June 16th to August 24th. Some 10.000 specimens at stage V, 40.800 at stage IV as well as a certain number at younger stages were liberated.

Sweden.

(Dr. K. A. Andersson.)

The research vessel "Skagerak" has been commissioned for nearly nine months for the purpose of biological investigations. The motor-boat "Clupea" belonging to the laboratory at Lysekil has been used for some minor studies especially concerning plankton.

Haddock. As in previous years statistical material regarding the landings of haddock at the fishing harbour of Göteborg has been collected.

During May the "Skagerak" made a cruise to the Skagerak and the Kattegat and carried out trawlings for fish eggs and fish fry. Altogether 20 stations were made in the Skagerak, on three sections between the Danish and the Norwegian coast, and on each station a great number of hauls were made, both with the 1 and the 2 m. ring trawl. The total amount of the horizontal hauls made at various depths with the 1 and 2 m. trawl was 102 and 65 respectively. The 65 2-m. hauls gave only 6 and the 102 1-m. hauls 21 specimens of haddock fry, practically all from between the Danish coast and the 100 m. line. The amount of eggs that could be determined with certainty as haddock eggs was 20, and 18 of these were caught between the 100 m. line and Hanstholm, on the most westerly section. It will thus be seen that the production of fry was very small.

Plaice. During September, the usual investigatio into the occurrence of the 0- and I-group of pla off the Swedish west and south coast have be continued (see Figs. 1 and 2). In this year also, t 0-group was fairly strong off the entire west coa but showed a very obvious augmentation in t Laholmsbay where the stock, on certain stations, w even more numerous than in the preceding year. T I-group off the coast of Bohuslän was somewhat bet developed than in the preceding year (see appendi

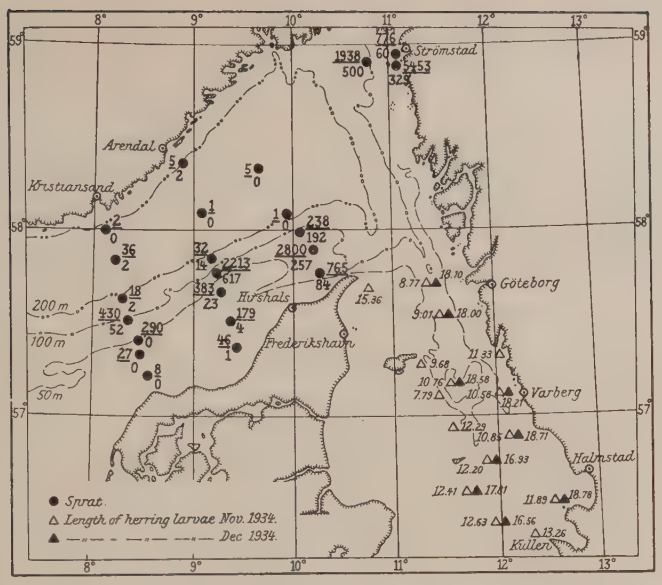
Sole (*Solea vulgaris*). While trawling for plaice a flounder some specimens of soles were caught a determined as to their age. Furthermore, statisti material relating to the landings of sole at the fish harbour of Göteborg and to the composition of t catches was collected.

Sprat. The main part of the fishery-biological wo carried out at the Laboratory of Lysekil has be devoted to sprat investigations, practically on t same plan as in the last two years.

The above-mentioned cruise (see haddock) into t Skagerak gave abundant results as to sprat eggs. T figures of the catches are plotted on the chart attach (Fig. 6). The plain (not underlined) figures give t amount of eggs caught in 3 vertical hauls from 10 to the surface with the Hensen egg-net. The und lined figures give the average amount of eggs cau in all 10-minutes horizontal hauls in various dep with the 1 m. egg-net. The results agree complet with those of previous years and similar seasons. T eggs concentrate within an area between the 50 a the 100 m. line on the Danish side. Farthest to t west the amount of eggs is relatively unimporta but it increases strongly to the east in the direct of the Swedish coast. In the north and within deep grounds of the Skagerak as well as on the shal area off the coast of Jutland the eggs were v scarce.

The year-class 1933 dominated throughout in catches of 1934. In the samples from the Skage and the Kattegat it constituted as much as 80 % of catch and even in the fjords almost the same percent was found. The great importance of the I-group been further emphasized by this year's experien The fluctuations of the fishery generally seem coincide with the fluctuations in the appearance the I-group in the catches. The prospects for fish in 1935 seem to be good, the year-class 1934 being abundantly represented in the fjords dur the autumn of 1934.

The investigations into the various races of sp off the west coast of Sweden have been continu Special attention has been paid to the sprat in so-called Uddevalla fjords. This race has a low num of vertebrae (average: 47.5 to 47.7). It spawns in the fjords already at the age of 1 year and wit length of 8.5 cm. Its growth increment is somew less than in other fjords and off the coast, and autumn, in its second year of life, the I-group reac rarely a length of 12 cm. (10.5 to 11.5 cm.), as the other fjord races. Its importance for the anch



3. Skagerak: Number of eggs of sprat caught in 1935. The underlined figures state the mean number of eggs nt in various depths by horizontal hauls of 10 minutes duration with a 1 meter ring net. The not underlined figures ate the total number of eggs caught in 3 vertical hauls with the Hensen Net from 10 metres depth to the surface.
Kattegat: the figures state the mean length of herring larvae caught in Nov.—Dec. 1934.

stry consequently decreases since it emigrates the fjords in great numbers already as I-group ng autumn and the following winter). The oup and older individuals are very scarce in the area in question. The growth increment takes ly place during spring and early summer. The ase in weight is put on partly during spring, ltaneously with the development of the gonads, y during late summer and autumn. During late mn and winter the weight again diminishes, ably on account of inferior feeding conditions. sprat's length increment during spring and ner and the ensuing weight increase during late ner and early autumn is the criterion for its value aw material for the anchovy industry during mn, when the sprat fishing proper takes place.

ring.

vo cruises have been carried out for the purpose tching herring larvae, on November 3rd to 12th December 16th to 19th respectively. The gear in all the trawlings was the 2 m. ring trawl with cket and worked as a closing-net. The hauls were ade horizontally and lasted 30 minutes. On every on a haul was made at the surface and as near he bottom as possible. On the deeper stations ner hauls were made in one or two intermediate hs.

November, 16 stations were taken and 10 of e were repeated in December.

onditions in November. On the 16 stations gether 47 hauls were made giving a total catch of 1170 herring fry with a length varying between 6 and 22 mm. The total average length was 11.59 mm. 350 specimens (= 30 %) had a length of 6 to 9 mm. and 820 specimens (= 70 %) had a length of 10 mm. and more.

The chart (Fig. 6) shows that the occurrence of the smallest fry (< 10 mm.) is practically limited to the central and northern parts of the area investigated. On the stations south of Anholt (Nr. 12, 13, 14, 15, and 16) only 18 specimens (5.7 %) belonged to the minor length group. On station 17, immediately ESE. of Herthas Flak, similar conditions prevailed; the two hauls made on this station gave 149 specimens and 5 only had a length of less than 10 mm.

In December, the occurrence of fry was much sparser and the single specimens were generally greater. 32 hauls at 10 stations gave altogether 194 specimens of fry only, with an average length of 17.72 mm., the length varying between 9 and 25 mm. The average growth increment during 5 weeks should consequently have been about 6 mm.

From the material at hand the following conclusions may be inferred: 1) the fry caught come from a spawning area whose limits practically coincide with the 50 m. line. 2) the November trawlings coincided with the end of the spawning period. No spawning of any importance can have taken place at the end of November or at the beginning of December.

A number of samples were collected for the purpose of age and race determinations.

In recent years a heavy trawl fishing for small herring has taken place in the northern Kattegat and

in the Skagerak. The catches produced by this fishing were subjected to a closer investigation.

Plankton. (See the report of the Plankton Committee).

Zostera marina.

The investigations into the occurrence of *Zostera marina* carried out during the autumn showed that this species has again begun to appear in the Bohuslän Skärgård, especially in the inner parts. Off the coast of Halland it has become extinct only in the most northerly parts. Apart from these districts the stock is just as intact as last year.

Publications.

HANS PETTERSSON, HANS HÖGLUND och SVANTE LA[N]BERG: Submarine Daylight and the Photosynthe of Phytoplankton, Meddelanden från Götebo Högskolas Oceanografiska Institution, Nr. 10, 19

ARVID R. MOLANDER: Skarpsillfiske och årsklasser. Svensk Fiskeritidskrift Nr. 17, 1934.

— Nya iakttagelser över förekomsten av Zost marina utmed svenska kusten. Ny Svensk Fiske tidskrift Nr. 21, 1934.

— Om rödspottebeståndets yngsta årsklasser i sö Östersjön. Ny Svensk Fiskeritidskrift Nr. 23, 19

BALTIC AREA
1934.

K. A. Andersson.

e work during the year 1934 was mainly devoted
study of the herring, the plaice and the flounder.
nost striking result of this work perhaps may be
reat abundance of the 0-group of the plaice in
outhern Baltic. Never before so great catches
been made in this area. In shallow water along
oast of Bornholm, the German coast east of
n and the southern Swedish coast the fishing
iments gave good catches.
e following are the reports of the work carried
n the area by the various countries represented
ie Committee.

Denmark.

Biology.

Investigations were carried out in the waters round Bornholm and East of Rügen during the latter half of August.

Plaice.

A very rich occurrence of the 0-Gr. was determined in August 1934 in Bornholm coastal waters as well as E. of Rügen (see Figs. 1—2). Fig. 1 shows the catches of the 0-Gr. per 30 minutes in "Tog" (a fine-meshed

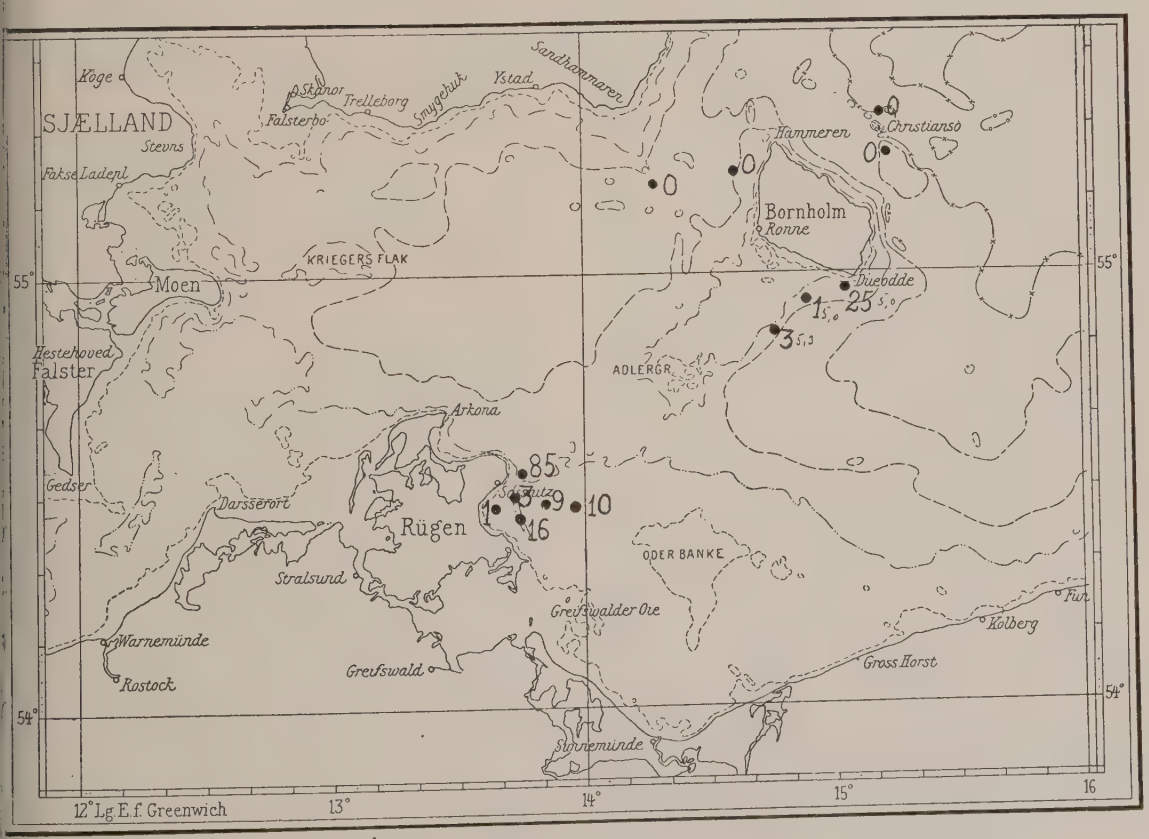


Fig. 1. Number of Plaice of the 0-group caught per 30 min. haul. with Tog in 1934.

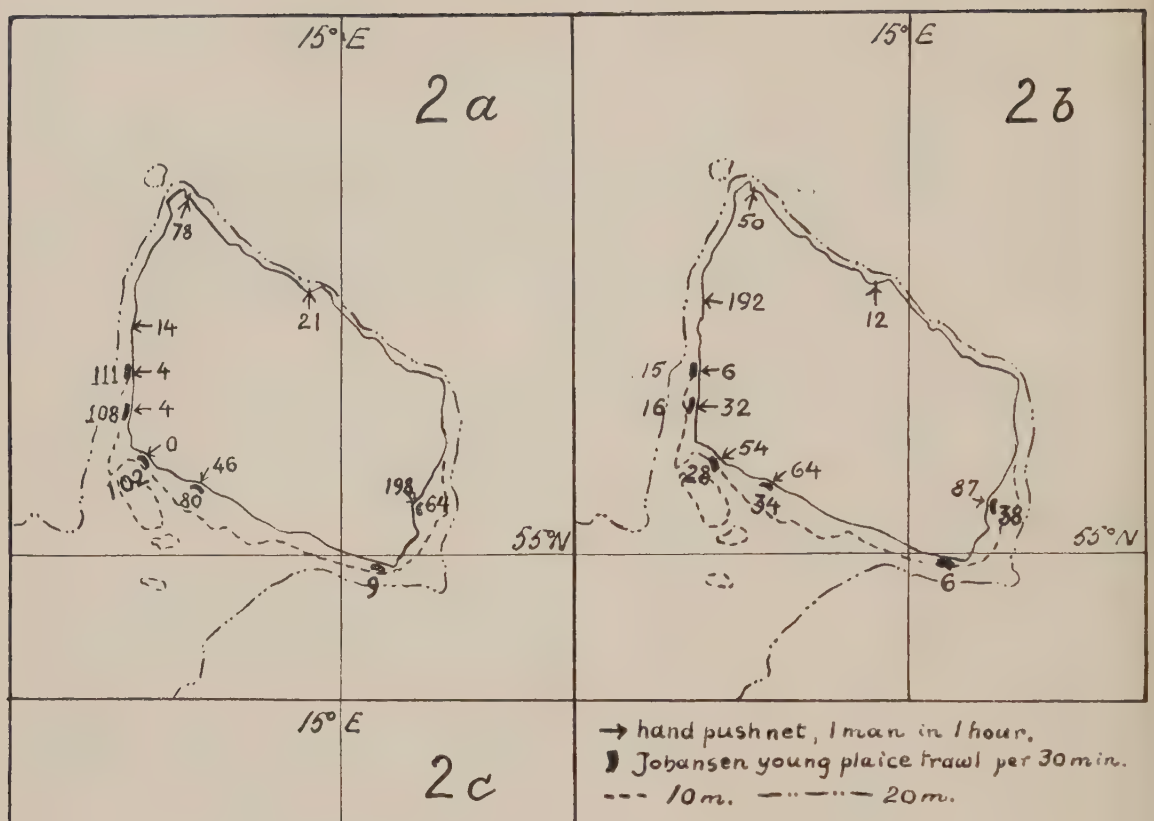


Fig. 2a. 0-group of plaice 1934.
Fig. 2b. 0-group of flounder 1934.
Fig. 2c. 0-group of turbot 1934.

Otter-Seine). It will be seen that the 0-Gr. is found on the southeastern slope of Rönne Bank and in the waters East of Rügen, whereas none were found in the deep waters West and North of Bornholm. East of Rügen the largest catches were made in the deep channel ("Sassnitzer Graben") near the coast, whereas the catches were much smaller in the mo shallow water East of the ' Graben". The mean leng of the individuals of the 0-Gr. caught in the de channel was 4.8 cm. (104 spec.), whereas the me length of those caught in the shallow water farth from the coast was higher: 5.9 cm. (20 spec.).

In addition to the fishing by the Tog, fishing Johansen's Young plaice trawl and by a hand pu net was carried out along the coast of Bornho in quite shallow water (0.5—2 m.); the results this fishing are shown in Fig. 2a. It will be seen th unusually large catches were made all round the coa the occurrence of the 0-Gr. is the richest one ev observed in Bornhlom waters.

The I-Gr. was very scarce East of Rügen and rou Bornholm while the II-Gr. was somewhat bet represented in the catches. Of the older age-grou a few specimens only were caught.

Flounder.

The 0-Gr. of the flounder (see Fig. 2b) was rat poor, poorer at any rate than in 1933.

ɔt.

0-Gr. of the turbot was somewhat better
ented round Bornholm in 1934 (Fig. 2c), and
uantity of this year-class must be regarded
ghtly above normal.

uation of the sea bottom was undertaken
e Petersen-grab in different parts of the Born-
waters.

e Food of the Herring. The investigations
d in 1932 have been continued.

drography. (See Hydrographical Committee
, p. 65).

Germany.

(Dr. E. Fischer.)

Hauptarbeit bestand im Berichtsjahr in der
eitung des umfangreichen Materials der Markt-
ngen an Plattfischen zur Herstellung eines
ntberichtes, dessen Veröffentlichung bald ge-
en wird.

Marktmessungen über Scholle, Flunder und
he wurden in etwas eingeschränkterem Umfange
setzt. Im Rahmen dieser Untersuchungen
n auch spezielle Unterlagen über die deutsche
olmfischerei in den letzten 5 Jahren gesammelt
usammengestellt. Während der Schonzeit wurde
ärz eine dreitägige Kutterfahrt in das Bornholm-
t unternommen und dabei die Verteilung von
le und Flunder und ihr Laichreifezustand
telt. Ferner wurden wieder Monatskarten der
fischfischerei in der Ostsee zusammengestellt.

Untersuchungen über die Brackwasser-
dern in der Ostsee wurden weiter fortgesetzt.
r konnten eingehend untersucht werden: Die
ler des Jasmunder Boddens, die des Greifs-
r Boddens und die in den Hiddensee-Gewässern
sondere die Flunder im Strelasund. Die Flunder-
nde dieser genannten Gebiete wurden sowohl
hre morphologischen Eigenarten hin untersucht
uch auf Grösse und Altersgruppen. Es wurden
rhin die Fortpflanzung, ökologische Verhält-
, Ernährung u. a. studiert. Die Untersuchungen
Flunder des Jasmunder Boddens haben ergeben,
es sich im Grossen Jasmunder Bodden vorwiegend
einen indigenen Flundernbestand handelt, der
regelmässig zum Laichen schreitet, dessen Larven
anscheinend nur bei günstigen Umweltsverhält-
n sich entwickeln. Daneben scheint hin und
er eine Bestandsergänzung von aussen her
densee-Gewässer usw.) nicht ausgeschlossen zu

was anders liegen die Verhältnisse bei der Flunder
Greifswalder Boddens und Strelasund. Obgleich
n morphologischer Beziehung nur wenig von der
der des Jasmunder Boddens abweichen, findet
ein reger Austausch mit Flundern der angrenzenden Ostseegebiete statt, wie Markierungen besonders im Strelasund zeigten.

Auch im letzten Jahr wurden die Untersuchungen über die 0 und I Gruppe unserer hauptsächlichsten Plattfischarten fortgeführt.

Ausser den Plattfischen waren noch Dorsch und Sprotten Gegenstand unserer Untersuchungen.

Dabei wurde besonders der Sprottzeesenfischerei in der westlichen Ostsee und an der Küste Vorpommerns Aufmerksamkeit geschenkt. Es wurden zunächst Untersuchungen über die Zusammensetzung der Marktanlandungen ausgeführt. Weiterhin wurde die Wirkung der Geräte auf den Bestand an Heringen und Sprotten und auf die Jugendstadien anderer Fische bei Teilnahme an mehreren Kutterfahrten festgestellt.

(Summary.)

The main work of the year under review consisted in working up the considerable material of the market measurements of flat fish as the basis for a comprehensive report in the near future.

The market measurements of plaice, flounders and dabs were continued on a somewhat limited scale. Special data of the Bornholm fishery in the past five years were collected and collated. A 3-day trip was made during the closed season (in March) and distribution of plaice and flounders and their spawning ripeness were determined. The monthly charts for flat-fish fishery in the Baltic were also compiled.

The researches into the brackish water flounders of the Baltic were also continued, three areas being specially investigated. In these areas the flounder stocks were investigated in respect of their morphological characteristics, and also by size and age-groups. Propagation, ecology, food etc. were also studied. The investigation of flounders of the Jasmund Bodden showed that an indigenous flounder population predominated which spawned very regularly; the larvae, however, apparently developed only in favourable environments. In addition there is apparently occasionally a building up of the stock from without (Hiddensee waters, etc.).

Conditions with flounders of the Greifswald Bodden and Strelasund were somewhat different. Although morphologically little different from the Jasmund-flounders, a definite exchange occurs with flounders in neighbouring Baltic areas as the markings, particularly in Strelasund, show.

Last year also investigations of the 0- and I-groups of our chief species of flat fish were continued. In addition to flat-fish, cod and sprat were also investigated. Particular attention was paid to local sprat fisheries off the Western Baltic and the coast of Pomerania. In the first place examinations were paid to the composition of market landings. Also the effect of gear on the stock of herrings and sprats and of the youthful stages of other fish were determined during several fishing boat trips.

Finland.

Biology.

Material for scale-analysis of Salmon has been collected as before (see the Salmon and Trout Committee). Statistics of the seals killed in the Gulfs of Bothnia and Finland were collected.

Hydrography.

(See Hydrographical Committee p. 66).

Latvia.

Statistics.

The Board of Fisheries and Pisciculture (Ministry of Agriculture) continued the Statistics of Sea Fisheries on the same scale as in the former years. The "Bulletin statistique des pêches maritimes de Lettonie, année 1932" has been published. The statistical materials for the years 1933 and 1934 are prepared for publication.

Hydrography.

(See Hydrographical Committee report, p. 67).

Biology.

The Fishery Laboratory (Ministry of Agriculture) continued the investigations of Salmon and Sea-trout, carrying out marking of undersized individuals captured in the Gulf of Riga. Determinations were also made of age and growth rate of Salmon and Sea-trout from different parts of the Gulf of Riga. Experiments in rearing salmon fry in ponds has been continued at the State Fish Hatchery at Tome.

The investigations regarding the fluctuations, growth rate and race distribution of the Flounder (*Pleuronectes flesus*) in the Baltic Sea and in the Gulf of Riga were continued at the Fishery Laboratory by Mr. W. Mannsfeld. The flounder fishery in the open Baltic Sea from the Latvian fishery regions of Liepaja and Ventspils is based on the deep-sea flounder, spawning in the Gotland Basin. The average number of vertebrae amounts to 36.22 for flounders landed at Liepaja and to 36.23 for the flounders of the Ventspils catches. In the Gulf of Riga the typical bank-flounder is occurring, with an average number of vertebrae of 36.09. The number of individuals with "complex vertebrae" amounts at Liepaja to 25 %, at Ventspils to 28 % and in the Gulf of Riga to 41 %. A detailed report of these investigations has been prepared for publication also in the "Journal du Conseil".

The Hydrobiological Station of the Latvian University (Director Prof. Dr. Embrik Strand) continued the investigations regarding the fishes and the plankton of Latvian coastal waters.

Poland.

1. Hydrography.

The report on the expedition to the southern part of the "Mittelbank" containing a new map of the bottom of these parts of the Baltic Sea, based the results of the echo sounding, was publish Arch. polonais d'Hydrobiol. et de Pêche, Vol. 1934.

Regular observations of temperature at diff depths were continued in two points near He in previous years. Near Gdynia and also at other points near the coast regular observatio temperature, salinity and oxygen-content were tinued.

Regular hydrographic observations in the sout part of the Baltic Sea were organised.

2. Fisheries Investigations.

Sprat.

(a) Analysis of catches of sprats was continued the results were compared with previous observati In the season 1932—33 for the first time there observed an admixture (up to 25 %) of imma sprats, $1^1/_2$ years old, in the shoals of larger mature fishes. In the 1933—34 season these you age-groups of fish were almost absent. But in 1934 for the second time the admixture of small fis to 8 cm. long, was observed and these small individ were found accompanying compact shoals of l sprats and were not mixed with young herri shad (*C. alosa*) or smelt (*Osmerus*), as is often case in dispersed shoals.

These facts draw attention to the necessity f new regulation of the size of mesh in the tra used in the sprat fishery.

(b) Investigations concerning the average we of sprats in different months show that, following the spawning season, the average weight diminis during August and September, the loss of we being from 1 to 3 grammes. After spawning average weight very soon reaches the same valu before. In the 1934—35 season the average we was 10 grammes (in 1931—32 it was 8 g. only).

The length of sprats the last season was on average greater than in former years. 31 % of i viduals were 12 cm. long and the group from 11 cm. formed 90 % of catches (72 % in 1931—32).

(c) The spawning season of sprats near the Po coast is in June and July. In the catches 42 % individuals were found with ripe and dischar gonads.

It was found that only a small part of the s shoals remains near the coast and spawns in Gulf of Danzig. By means of Petersens young trawl a small quantity of larval stages was fo in the Gulf of Danzig, 15 miles N.E. from Hel P At increasing distance from the shore and in open Baltic Sea more larvae were found in the catc All larvae were at a very young stage. Older st of development were found near the shore in water not deeper than 1.5 m. It is intended to st these larvae during 1935 with the aid of the n purchased motor boat "Meduza" now belongin the Marine Station in Hel. In the coastal wa during the winter 1934—35 there were also f

sprats of 3.5—7 cm. in length, belonging to
4 class, but from the first days of the spawning

he action of the ordinary trawl used for the
shery upon the population of these fishes was
. The research schooner "Ewa" and five
y cutters were engaged in these investigations.

fish was studied in the coastal waters and in
per waters of the Gulf of Danzig. 503 indi-
from different places were studied.
t was proved that in the coastal waters young
months old and 10—20 cm. long, is a common
m June to January. In February the fish
25 cm. — In the deep water of the Gulf of
3-year-old and older cod is to be found.
he rate of growth was determined from scales
's method). In the first year a slow growth
m.), is characteristic. The second year shows
st rapid growth (to 20 cm.); the following
to the 6th, show on the average an increase
m. in length every year.
he development of gonads is rapid. In the
ar 60 % of females and all males are ripe.
spawning takes place in the deep waters in
lf of Danzig in June, July and August.
he food of young cod in the coastal waters
the summer months consist chiefly of *Mysis*
s and *M. mixta*. Older fishes devour Ammodytes
ds and Gobius.
he deep waters of the Gulf of Danzig, especially
ter, the larger cod feeds on *Mesidothea entomon*.
ing also *Mysis mixta*, herrings and sprats are

he cod from the Gulf of Danzig is therefore
nt from the cod from the Western Baltic Sea,
the time of spawning, the food and the rate
wth are very different.

ishes.
he results of the investigations concerning the
f growth of flounders from the Gulf of Danzig
published in the Intern. Revue f. ges. Hydrogr.
drobiologie.
Marking experiments with flatfishes were con-
and 419 fishes were liberated near Bornholm
the Gulf of Danzig. From 219 fishes liberated
he Polish coast 29 were recaptured in the Gulf
nzig and 6 in the more western part of the Baltic
Of 200 fishes set out near Bornholm, 18 were
tured on the Oderbank, near Kolberg, near
münde and near Sassnitz. The results of markings
once more that flatfishes from the western
of the Baltic Sea do not migrate to the eastern
s.

ological Investigations.

study of the bottom fauna of the Polish waters
continued, especially within the scope of a determination of biocoenoses and of the conditions of life of different species. — The distribution of different species was shown on charts. Two main biological types of bottom animals are clearly shown on these charts: one eurythermic and shallow-water type and the other stenothermic, cold and deep-water type. The last type is almost uniform, but the shallow water type is very variable. In the open Baltic Sea the limit between the two types is at a depth of 40 m., but in the Gulf of Puck at only 25 m., in both cases in the summer months. Special attention was paid to the study of the distribution of the lamellibranchiates, which form one of the main foodstuff for fishes.

Careful studies of the fauna of the Polish waters resulted in the discovery of some forms not recorded in older lists. 21 new species of animals were found, among them *Cyanea capillata*, common in the North Sea, an apendicularia, *Fritillaria borealis* and *Gadus aeglefinus*.

Plankton investigations were continued and the materials collected were given to specialists for determination.

Parasites of fish, especially of flounders, were studied and the results of these investigations have already been published.

4. Salmon Investigations

are reported in the Report of the Salmon and Trout Committee.

M. Siedlecki.

Sweden.

During the year investigations at sea were carried out by the motorboat "Eystrasalt" and the research vessel "Skagerak".

The "Eystrasalt" was kept in commission from May 11th to October 7th and cruises were made along the entire eastern coast of Sweden. Also at many stations on deeper water biologic and hydrographic observations and fishing experiments were carried out.

The "Skagerak" made one cruise to the Baltic in August and September.

Biology.

Herring.

A detailed study of the biology of the herring in the great "skärgård" off Stockholm was commenced.

A great number of samples were collected from different parts of the Baltic for studying the age composition of the stock.

Flounder.

Many fishing experiments were made for the study of the stock. Along the coast as far north as to the southern part of Stockholm "skärgård" the stock was rich.

In August and September many hauls were made in order to collect samples of the 0- and I-group. By the end of July the catches of the I-group were good in the southern part of Stockholm "skärgård", and along the coast of Gotland in shallow water the 0-group was fairly rich in August. The catches of the 0-group in the Kalmar Sound were small.

In the Bornholm area along the coast of Scania and Blekinge the 0-group and the I-group were fairly abundant. In the following table a comparison is made of the catches of the 0- and the I-group during the years 1929—1934.

Catches of the 0- and the I-group of the Flounder in the southern Baltic during the autumns of the years 1929—1934, 30 minutes hauls.

South coast of Scania		1929	1930	1931	1932	1933	1934
Östra Torp	0	5	75	—	59	127	101
	I	—	9	21	6	97	66
Ystad, West harbour	0	2	165	2	80	99	52
	I	—	36	8	2	271	114
Ystad, Saltsjöbaden	0	12	52	38	215	537	158
	I	10	21	14	5	409	42
Sandhammaren	0	1	—	—	1	9	15
	I	8	—	3	6	93	41
East coast of Scania							
Örnehusen	0	10	3	3	36	68	24
	I	26	11	8	3	15	66
Kivik	0	12	48	6	50	93	31
	I	6	6	5	2	13	47
Stockbacken	0	7	30	1	16	43	48
	I	23	6	23	1	28	19
Syd Helgeån	0	2	13	1	27	51	58
	I	21	6	25	1	29	17
Nord Helgeån	0	—	—	—	—	40	67
	I	—	—	—	—	16	103
South coast of Blekinge							
Yngsjö	0	6	57	1	27	31	66
	I	12	8	28	0	22	24
Hörvik	0	22	219	15	196	277	190
	I	169	126	82	30	82	106
Karlshamn	0	4	72	53	130	397	109
	I	104	78	140	87	31	337
Aspö	0	0	—	1	0	2	—
	I	24	—	14	5	15	—

Plaice.

As already said the fishing experiments in September for the 0-group gave surprising results, — they were exceptionally rich. In a haul of 30 minutes off Ystad up to 1,047 specimens were caught. On the following table a comparison is made of the catches of the 0-group during the years 1929—1934. The stock of plaice in the Bornholm area was also studied.

Catches of the 0-group of plaice in 1/ meters depth in the years 1929—19 30 minutes hauls.

South coast of Scania	1929	1930	1931	1932	1933
Skanör	—	—	—	—	—
Kämpingebukten	—	—	—	—	—
Östra Torp	0	0	0	0	5
Ystad, West harbour	1	6	3	5	0
— , East —	—	—	—	—	0
— , Saltsjöbaden	5	13	1	5	1
Sandhammaren	2	—	0	0	0
East coast of Scania	1929	1930	1931	1932	1933
Örnehusen	2	3	0	2	4
Kivik	0	5	0	0	0
Stockbacken	0	2	0	0	0
Syd Helgeåns estuary	0	1	0	0	0
Nord — —	1	1	0	0	0
South coast of Blekinge					
Yngsjö	—	—	—	—	0
Hörvik	0	0	0	0	0
Karlshamn	0	0	0	0	0
Aspö (Karlskrona)	0	0	—	0	0

Turbot.

Fishing experiments were carried out at the c of Gotland and in the Bornholm Area for the stud the stock. Many hauls were made for collecting 0- and the I-group on shallow water at Gotland in the southern part of Stockholm "skärgå These stages were well represented in the catch

A turbot marked and liberated on the east coast of Scania off Simrishamn on the 6th of J 1932 was recaptured on the first of June 1934 the Adler ground. It had increased in length f 28 to 30 cm.

Cod.

The stock of the cod was studied in diffe parts of the area. In the middle part of the Ba the catches were small but in the southern part t were rather good.

Salmon and sea trout.

(See the Salmon and Trout Committee report

Plankton.

The quantitative investigations have been contin at many stations and at different areas.

Hydrography.

At all stations where biological observation fishing experiments were made hydrographic obs ations also were carried out.

During the cruise with the "Skagerak" to Baltic the investigations concerning the current different depths and the submarine waves carried out. (See further the Hydrographic Commi report).

Summary of 1934-cruises.

ark.

'Biologen"; Dr. H. Blegvad; Bornholm waters; of plaice, flounder etc.

d.

'Nautilus"; commissioned July 3rd—23rd (Dr. N); general biology.

Latvia.

S/S "Hidrografs"; Messrs. Ozolinš and Mannsfeld; commissioned May 7th—30th, Oct. 15th—30th: general biology.

Sweden.

S/S "Skagerak"; Dr. Molander and Mr. Landberg; S. Baltic: 0-group of plaice, flounder etc. M/S "Eystrasalt"; Dr. Hessle and Dr. Dahl; E. coast Sweden; Herring, Plankton etc.

HYDROGRAPHICAL COMMITTEE

1934.

Prof. MARTIN KNUDSEN.

Summary of cruises in 1934.

Belgium.

S/S Victoire **(Vt)**; Jan. 13th—26th, Mar. 2nd, 3rd, 14th—16th, 29th, Apr. 13th, 16th—20th; Belgian and French coast; t° and S $^0/_{00}$.

S/S Zinnia **(Zi.)**; Jan. 22nd—23rd, Febr. 5th—8th, Mar. 26th—27th, Apr. 24th—25th, May 21st—22nd, Sept. 10th—11th, Oct. 15th—18th, Nov. 19th—20th, Dec. 10th—11th; Southern Bight of North Sea; t° and S $^0/_{00}$.

S/S Saphir **(Sr)**; Juli 5th—Oct. 20th; surface temperature records by thermograph on the route Ostend—Tilbury.

Denmark.

S/S Biologen **(Bi)**; Apr. 4th—Oct. 24th, commissioned in Danish waters; t°, S $^0/_{00}$ and O_2.

S/S Dana **(Da)**; Apr. 11th—21st, North Sea; Apr. 22nd—May 6th, Faroes; May 6th—25th, Iceland; May 25th—31st, Faroes; June 1st—30th, North Sea; July 1st—11th, Faroes; July 12th—16th, North Sea; t°, S $^0/_{00}$, O_2, P_2O_5 and NO_2, drift bottles.

H.M.S. Þorr **(Th)**; Aug. 10th and 17th, Nov. 6th, 11th, 14th, N. coast Iceland; t° and S $^0/_{00}$.

H.M.S. Hvidbjørnen **(Hv)**; Mar. 31st, Apr. 9th, June 1st, S. coast Iceland; July 7th—10th, Denmark Straits; Sept. 27th—29th, Oct. 16th, S. coast Iceland; t° and S $^0/_{00}$.

H.M.S. Ingolf **(In)**; June 28th—29th, Aug. 16th, W. coast Greenland; t° and S $^0/_{00}$.

H.M.S. Maagen **(Mg)**; June 22nd, W. coast Greenland; t° and S $^0/_{00}$.

England.

H.M.S. Challenger **(Ch)**; Apr.—Aug., English Channel to West Indian Waters; t° and S $^0/_{00}$.

H.M.S. Beaufort **(Be)**; June—July, W. coast Scotland; Nov., English Channel; tidal streams, t° and S $^0/_{00}$.

S/S George Bligh **(G.B.)**; Apr. 30th—Nov. 3rd, North Sea; t°, S $^0/_{00}$, P_2O_5; from May 31st to June 6th, drift bottles.

S/S Onaway **(OW)**; Jan. 13th—22nd, Febr. 14th—16th, Mar. 20th—23rd, Apr. 19th—22nd, Sept. 20th—26th; t° and S $^0/_{00}$.

S/S Salpa **(Sa)**; monthly observations of t°, S $^0/_{00}$, P_2O_5, Fe, at stations E_1—E_2, L_1 to L_6 South of Plymouth.

Finland.

S/S Nautilus **(Na)**; July 3rd—23rd, Baltic and of Bothnia; t°, S $^0/_{00}$, O_2, pH, A observations a previous years.

France.

S/S Président Théodore Tissier **(TT)**; May 10t July 5th, S. Ireland, English Channel, North Transition Area, North Sea, W. Ireland; subma cartography; Sept. 1st—Nov. 7th, N. Atlan Newfoundland, Entrance to St. Laurence Ri Azores; submarine cartography, t° and S $^0/_{00}$, general hydrology.

S/S Pourquois-Pas **(PP)**; June—Sept., Icelan E. Greenland; t° and S $^0/_{00}$.

S/S Ville d'Ys **(VY)**, May—Nov., Newfoundlan Greenland; t° and S $^0/_{00}$.

S/S Ardent **(Ar)**; irregular observations.

Germany.

M/S Augusta **(Au)**; monthly cruises in S. N Sea, Helgoland waters; t° and S $^0/_{00}$.

S/S Elbe **(El)**; Nov. 8th—11th, Dec. 14th, Elb English Channel; surface t° and S $^0/_{00}$.

S/S Weser **(We)**; Oct. 2nd—Nov. 5th, Doggerb to northern part of Flemish Bight; t° and S surface observations.

S/S Meteor **(—)**; Oct. 1st—Nov. 9th, Icela waters; ? observations.

Holland.

H.M.S. Nautilus **(Nu)**; June 24th—Aug. 1 N. North Sea; t° and S $^0/_{00}$.

Irish Free State.

S/S Muirchu **(Mu)**; Febr. 13th—20th, N. an coast of Ireland; May 24th—25th, N. coast; J 6th—14th, S. coast; Aug. 7th—8th, N. coast; 22nd—23rd, S. coast; Nov. 15th—17th, N. co t° and S $^0/_{00}$.

Latvia.

S/S Hidrografs **(Hi)**; May 7th—30th, Oct. 15 30th, Gulf of Riga and inner Baltic; t°, S $^0/_{00}$, P_2O_5, A, NO_2, pH.

Double letters in brackets refer to characters by which observations may be recognized in the Bulletin Hydrographi

.y.

Johan Hjort **(J.H.)**; commissioned in Norwe-aters from Febr. 5th—July 20th and Sept. 2nd; t°, S ‰, O_2, P_2O_5, pH.

Armauer Hansen **(A.H.)**; Jan. 1st—Dec. 20th, ian coast; t°, S ‰, O_2; July 12th—29th rrent observations.

Sparre Schneider (—); Febr.—Dec., beginning month; 7 stations at Tromsø coast and fjords; 00, O_2, pH, P_2O_5, NO_2, Am, Alk.

1.

Dar Pomorza; 66 stat. S. Baltic (Mittelbank); 00.

gal.

Albacora **(Al)**; Jan. 5th—6th, Jan. 25th—25th, May 8th—31st, Aug. 8th—Sept. 17th, 5th—28th, coasts of Portugal (in Sept. Straits raltar); t°, S ‰, O_2, P_2O_5, NO_2, NO_3, pH. urrent observations also.

nd.

"Explorer" **(Ex)**; Mar.—Apr.: Aberdeen to and eastwards to 1° E., N. Scotland, Shet-and Orkneys to Butt of Lewis. Apr.—May: een Bank, Gut, Fisher Bank, N. and N.E. , Northumberland coast, Fladen, Bressay, bank, Flugga, W. Shetland, Foula, Noup East Orkneys, Outer Moray Firth. June—July: en, Stavanger, Lerwick, Bergen, Lat. 61° N., tlands, Fair Isle, Bressay, Moray, Fladen. a) Outer Circle: Aberdeen, Ling and Fisher N. Dogger, Firth of Forth; b) Inner Circle: en Bank, Gut, Berwick Bank; Fladen Ground. Oct.: Buchan Deep, Bressay, Fair Isle, W. Orkneys, N. Scotland, Butt of Lewis, N. Rona, Noup Deep, Foula, Flugga, E. Shetlands, Moray Firth. Nov.—Dec.: Fladen, Bressay, Fair Isle, E. Orkneys, Moray Firth, Gut, E. Scottish Bight. General hydr. conditions; t° and S‰, in June—July: Tidal stream survey at fixed stations.

Spain.

S/S Xauen **(Xa)**. Prof. Rafael de Buen; cruises in February and July.

Sweden.

S/S Skagerak **(Sk)**; July 16th—Aug. 22nd, Kattegat—S. Baltic; internal waves and currents; Nov. 28th—Dec. 4th, Kattegat and Swedish fjords; optics of sea-water; t° and S ‰.

Light-vessel and Liner-observations.

All countries have collected surface temperatures and salinities on the regular routes and from the regular light-vessels as in previous years; no change has been made, but material received from the Oceanography Dept., the University of Liverpool, consisting of data from cross channel steamers, lightships and lighthouses (8 stations) 3 times per week from May to Dec. will be included in the Bulletin Hydrographique for 1934.

Thermograms have recorded, for the second year, surface temperatures on the Norwegian routes 1, 6 and 7 from Bergen to Iceland and new thermographs have been fitted on the Norwegian liners on the routes Stavanger-Newcastle and Stavanger-Rotterdam. Weekly records were collected on these routes during the latter half of 1934.

REPORTS

Belgium.

rth Sea and E. Channel.

the West Hinder light vessel, the usual obser-s have been taken: surface temperature and rological observations (daily), water samples surface and bottom (weekly). Four hydro-cal stations have been worked at each crossing Channel entrance by "Zinnia". First trials have made with a thermograph showing the tenths degree on the daily steamer route Ostend—y.

Denmark.

By Professor M. Knudsen.

n Western Area.

ing the cruises of the "Dana" from April 21st ne 1st and from July 4th to July 14th hydro-ical investigations comprising determinations of erature and salinity and to some extent also ygen-, phosphate- and nitrate contents were carried out at 185 stations. Most of these stations were situated in the coastal waters of the Faroes and Iceland.

Among the investigations on deeper waters may be mentioned observations from May 22nd to May 25th at 9 stations in a section running from Langanes (East Iceland) to a point 200 naut. miles East of Langanes (66°22′ N. — 6°26′ W.), and at 7 stations in a section running from this point southward to the Faroes. At several of these stations drift-bottles were thrown out.

Hydrographical investigations were carried out in the Faroe-Shetland Channel on April 22nd, on May 31st, and on July 12th, each time at about 12 stations in a section between Flugga and Østerø.

Permanent hydrographical investigations have been commenced on certain sections at Iceland and West-Greenland by kind cooperation of the R.D. Navy and the Icelandic Government.

If possible hydrographical investigations will be carried out 4 times a year at Iceland, namely in the

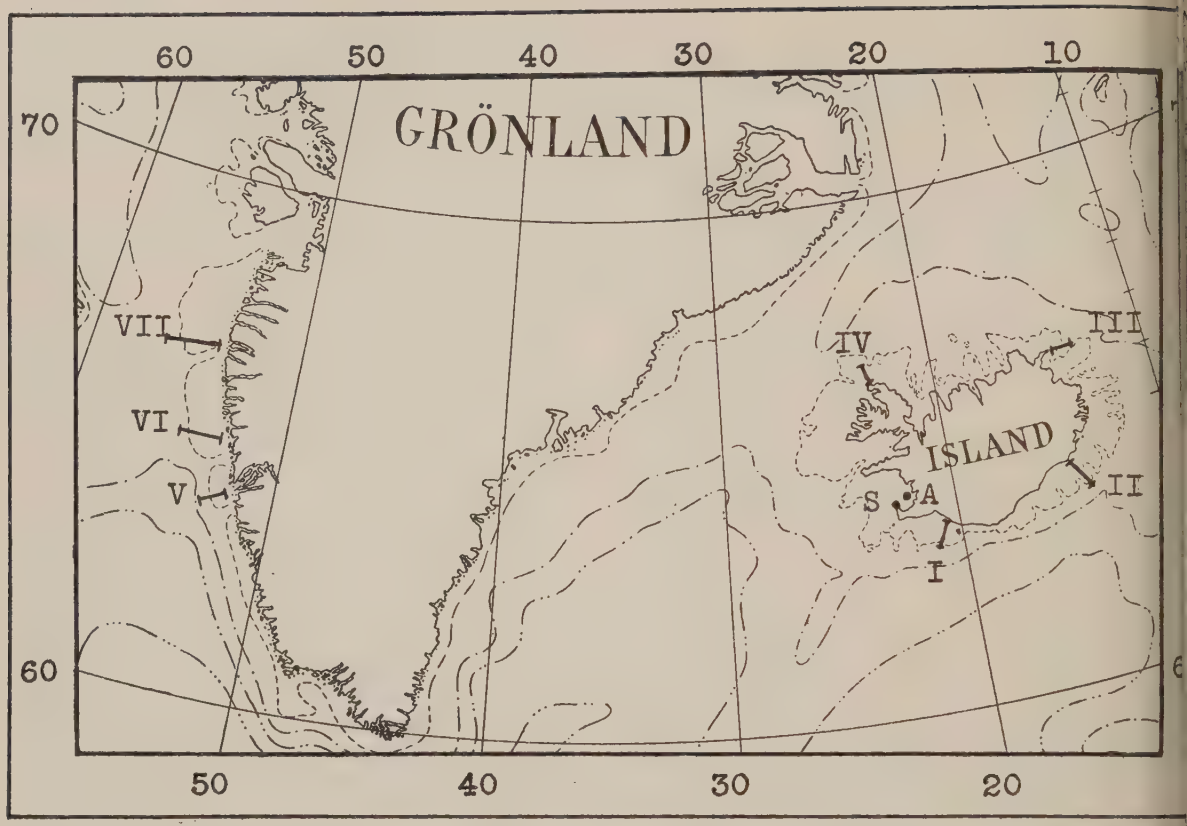


Fig. 1. Chart showing situation of permanent hydrographic sections. For positions of the individual stations, see t

months of February, May, August and November, and each time at the following localities:

Sect. I. Section across the Selvogr Bank:
1. 63°41′ N. — 20°40′ W.
2. 63°31′ N. — 20°52′ W.
3. 63°21′ N. — 21°04′ W.
4. 63°11′ N. — 21°16′ W.

Sect. II. Section off Vestre Horn:
1. 64°12′ N. — 14°52′ W.
2. 64°02′ N. — 14°41′ W.
3. 63°52′ N. — 14°30′ W.
4. 63°42′ N. — 14°19′ W.

Sect. III. Section off Langanes:
1. 66°22′ N. — 14°27′ W.
2. 66°22′ N. — 14°01′ W.
3. 66°22′ N. — 13°35′ W.

Sect. IV. Section off Kögr:
1. 66°30′ N. — 23°00′ W.
2. 66°41′ N. — 23°09′ W.
3. 66°53′ N. — 23°19′ W.

"S" Station off Skagi: 64°08′ N. — 22°46′ W.
"A" Station off Akranes: 64°14′.5 N. — 22°13′ W.

If possible, observations will be carried out tw a year at West-Greenland (in June and Septemb at the following localities:

Sect. V. Section across Fylla Bank:
1. 64°01′ N. — 52°19′ W.
2. 63°58′ N. — 52°44′ W.
3. 63°53′ N. — 53°22′ W.

Sect. VI. Section across Lille Hellefiskebanke:
1. 65°06′ N. — 53°00′ W.
2. 65°06′ N. — 53°32′ W.
3. 65°06′ N. — 54°58′ W.

Sect. VII. Section across Store Hellefiskebanke:
1. 66°53′ N. — 54°10′ W.
2. 66°50′ N. — 54°42′ W.
3. 66°46′ N. — 55°36′ W.
4. 66°41′ N. — 56°38′ W.

The situations of the sections and stations n tioned are indicated on the chart (Fig. 1).

Hydrographical observations have been carried by the "Thor"-expedition (Captain A. Trolle).

Surface observations have been collected from li to Iceland and Greenland.

All observations mentioned above will be publi in the "Bulletin Hydrographique" for 1934.

rth Sea.

rographical observations were carried out from ana" in April, June and July. The observations sed determinations of temperature, salinity, ate and nitrate content. As far as can be from the rather restricted material, it seems e summer minimum of nutrient salts had not ached on April 20th, but on June 1st it seemed e been completed.

rth Sea.

rographical investigations comprising deter-ons of temperature, salinity, phosphate and , were carried out from "Dana" during the two in our area. In the middle of April the summer um of nutrient salts seemed to have been reached llower water, but over deep water appreciable ts still remained, even on the surface. In June mmer minimum had been reached.

y observations of temperature and salinity hydrometer) from the lightships "Horns Rev" Vyl" have been undertaken by the Danish rological Institute and will be published in the l report of the Institute.

sition Area.

ervations of temperature and salinity — and at stations also of oxygen — have been carried om the "Biologen" in close connection with the ical investigations, mainly during the months ril—May and October. Observations were made in the fjords and partly in the open sea. The part of the material will be published in the in Hydrographique.

surements of temperature and salinity (with meter) from Danish lightships and from coast-ns have, as in previous years, been undertaken e Danish Meteorological Institute and will be hed in the Nautical-Meteorological Annual of nstitute.

c Area.

servations of temperature and salinity were d out from the "Biologen" at some few stations f Bornholm in August 1934. The observations e published in the Bulletin Hydrographique.

the surface at Christiansø near Bornholm the h Meteorological Institute has made daily vations of temperature and salinity (by hydro-). These observations will be published in the cal-Meteorological Annual of the Institute.

England.

By Dr. J. N. Carruthers.

orth Sea.

ce again Drift-Indicator work has been in train ghout the entire year from the two English ships "Varne" and "Cromer Knoll". A report nting eight years' results from the Varne light-s ready for printing. In it the fishery applications are not made, but work on a further report which will deal with them is in progress. The records from both the lightvessels have been compounded as before (see the last "Rapport Administratif" under S. North Sea) and exactly similar wind data have been preserved. The same scheme of drift-bottle work has been continued also — including a repetition of the South-West Dogger Bank Swirl investigation. The latter was made in July 1934, and the movements of the bottles were very markedly different from what they were on the previous occasions.

The average daily flow of water past the Varne lightship worked out for the year 1934 as a whole, was 3.9 miles towards N. 7° E. This direction is almost identical with that for 1932 and implies less frequent reversals and "hold-ups" than occurred during 1933. Whereas 1933 had only one month (January) with a bold flow into the North Sea, 1934 had four — April, September, October, and December. In the last month of the year the average daily flow was 10.8 miles a day towards N. 29° E. February was the month witnessing the most pronounced reversal. Eight months of 1934 — January, March, April, May, August, September, October and December — were characterised by dominant S.W.'ly winds. Two months — February and June — were N.W.'ly wind months, whilst during July the winds were dominantly W.'ly. The remaining month (November) was a month of dominant N.E.'ly winds.

During the year, a short paper dealing with the flow of water past the "Seven Stones Lightvessel" was published. "The Flow of Water Past the Seven Stones Light Vessel" by J. N. Carruthers. Journ. Mar. Biol. Assoc. Vol. XIX, No. 2. May, 1934. pp. 921—930.

By J. R. Lumby.

The regular collection of surface salinity samples and temperature observations has been maintained unaltered. The lines and lightships from which the work is done are as follows:

North Sea.

Shields—Oslo	Weekly series
Hull—Copenhagen	— —
Folkestone—Dunkerque (in co-operation with France[1])).	— —
"Smith's Knoll" Lightship	Obsn. every 4th day
"Varne" Lightship	— —

English Channel.

Newhaven—Dieppe	Weekly series
Southampton—Havre	— —
— —St. Malo	— —
Plymouth—Guernsey	— —
Lands End—Ushant (under the control of M.B.A., Plymouth).	Fortnightly series
"Seven Stones" Lightship	Obsn. every 4th day

[1]) Analyses made in France.

North Atlantic.

English Channel—West Indies.. Monthly series
— — —South America — —

Hydrographic observations were made throughout the year with the research vessels "George Bligh" and "Onaway" in the south-western and central North Sea. This work was done mainly in connection with plankton and herring investigations, and comprised surface and subsurface observations of temperature, salinity, and, occasionally, phosphate and oxygen content. As the analyses are completed, lists of data have been sent regularly to Copenhagen. The salinity and oxygen analyses were made at the Government Laboratory, London, and phosphate samples were examined at Lowestoft.

The work on the estimation of mean values of surface temperature and salinity in the English Channel for the period 1903—1927 was completed and the report is in the press.

English Channel.

By Dr. E. J. Allen, Plymouth.

Dissolved inorganic phosphate is recorded as mg.P per cubic metre, corrected for salt error. Until April 9th 1934 the original procedure of Atkins was followed, results obtained with which must be multiplied by 1.26 to correct for salt error in water of 35 $^0/_{00}$ salinity (Buch, Rapp. et Proc.-Verb., 1928, *53*, 98), Ibanez, Journ. du Conseil, 1933, VIII, 326). However, Brujewicz (Methods of Chemical Oceanography, Moscow, 1933, p. 118; cf. Subow, Oceanographical Tables, Moscow, 1931, p. 177) gives a factor, 1.35, for water of 35 $^0/_{00}$ salinity but since the relevant texts are in Russian it has not been possible to consult their experimental methods. Brujewicz' figure has been used in the work on U.S.M/Y 'Atlantis' working from Woods Hole (Bull. Hydrographique, 1933, p. 97, (1934)), so that results there are not directly comparable with those here recorded.

On and after April 20th 1934, the amount of acid molybdate reagent added was reduced by half (Kalle, Ann. d. Hydr., 1934, 62. Jahrg., S. 65—74, 95—102; cf. Journ. du Conseil, 1934, IX, 404). The corresponding factor calculated from Kalle's data is then 1.13 as determined with the red S 72 light-filter in the Pulfrich photometer. This factor has been confirmed at Plymouth for direct visual comparison in Hehner cylinders.

All figures for dissolved inorganic phosphate as P_2O_5 published from the Plymouth Laboratory up to and including December 15th 1933 are uncorrected for salt error and need to be multiplied by 1.26 to obtain the true values in terms of P_2O_5 or by 0.55 in terms of P.

Finland.

Baltic Area.

1) Regular observations were made as follows:
   a) Surface temperature daily, surface salinity every 5th day, temperature and salinity at different depths every 10th day at 27 coastal stati and 9 lightships.
   b) Surface temperature and salinity by liners fr Finland to Denmark.
   c) Currents at three depths three times da at 9 lightships.
   d) Registration of the sea-level at 17 stati and readings of the sea-level at 20 stations
   e) Records of ice conditions in journals a sketch-maps at about 100 stations and by Finnish ships in the Baltic.
2) A hydrographical cruise was made in July 19 in the Baltic north of Gotland, during wh 71 stations were made. On this cruise samp for the determination of chlorinity, oxyg alkali reserve were collected. In addition det minations of hydrogen-ion-concentration were ma on board.

France.

See Summary of Cruises.

Germany.

By A. Schumacher.

The meteorological investigations in respect of t determination of phosphoric acid in sea water w continued. A third paper was published on t subject: K. Kalle, "Meereskundliche chemische U tersuchungen mit Hilfe des Zeissischen Pulfri Photometers". Ann. d. Hydrogr. 1934, pages 65—9 The drift bottle experiments undertaken during t international investigations in the Kattegat August 1931 were worked up; B. Schulz "Flasch postenuntersuchungen im südlichen Kattegat, 10 17. August 1931" Ann. d. Hydrogr. 1935 pages 1— A report by B. Schulz on the hydrographical c ditions of the Kattegat before and after the per of the international investigation in August 1931 w appear during the next few months.

S. North Sea (by A. Bückmann).

The regular observations on board the Germ lightships and in the Helgoland roads were continu as hitherto. Preparations were made to improve observations on the lightships (especially with reg to current measurements) and to enlarge th (2-hourly observations instead of 4-hourly on Furthermore, the periodical cruises were car out from 4 stations as hitherto.

On two cruises of the fishery patrol vessels "Wes (Oct.—Nov.) and "Elbe" (Nov.—Dec.) hyd graphical material was collected from the surf of the Doggerbank area and the Hoofden, and Hoofden and the eastern part of the English Chan respectively.

A report on the observation of currents from lightship "Borkumriff" has been published A publication by F. Zorell entitled "Hydrogra der Deutschen Bucht" will appear in the spring 1935, as well as a report by E. Goedecke on

inity observations in the lower Elbe and in the nan Bight.
uring March and December investigations were e by the "Deutsche Seewarte", at the initiative e Biological Institute, into the vegetable nutritive tances and the detritus of the sea water around oland.

Holland.

By P. M. van Riel.

orth Sea.

ne regular observations have been continued as re:
rface observations. Kon. Ned. Meteor. Instituut, Bilt.
4-hourly observations of surface temperature daily observations of surface salinity. (Decade ns in Bulletin Hydrographique).
ghtships Noord-Hinder **(NH)**, Haaks **(Ha)** and chellingerbank **(TB)**.
4-hourly observations of surface temperature. ade means in Bulletin Hydrographique).
ghtships Schouwenbank **(SB)** and Maas **(Ma)**.
Regular temperature and salinity observations xed stations on the following steamship routes. ade means in Bulletin Hydrographique).
issingen—Harwich,
bek van Holland—Gravesend,
muiden—Hull.

Jorth Sea.

Surface and deep water observations.
. M. S. Nautilus. Observations carried out in e and July by Dr. J. J. Tesch. Temperature and ity at 51 stations between Orkney and Shetland ds, between the latter and the Norwegian coast, ne Skagerak between Norway and Denmark and he region to the east of Scotland.
ne titrations have been carried out at the Rijks- tuut voor Chemisch, Microbiologisch en Hydro- sch Visscherijonderzoek, Den Helder, Director IEBERT.

Irish Free State.

ntic Slope.

ydrographic cruises for the determination of surface salinities and temperatures were made ollows:—

ruary	13/14	S. coast of Ireland	7	Stations.
	17/20	N. coast - —	12	—
	24/25	N. coast - —	15	—
e	6/14	S. coast - —	11	—
ust	7/8	N. coast - —	15	—
	22/23	S. coast - —	9	—
ember	15/17	N. coast - —	14	—

he salinities have been determined in the oratory of the State Chemist, Dublin, and duplicate water-samples have from time to time been submitted to the Service Hydrographique at Copenhagen.

Latvia.

Baltic Area.

Two hydrographical cruises with the research vessel "Hidrografs" were carried out by the staff of the Fishery Laboratory (Ministry of Agriculture) in June and October in the Gulf of Riga and in the Baltic Sea. Observations were made at several positions and in depths to 200 metres. The determinations comprehended: temperature, salinity, oxygen, phosphate, ammonia, nitrogen compounds, hydrogen ion concentration and alkalinity. The results will be published in the "Bulletin Hydrographique".

In collaboration with Prof. Dr. E. Zarinš of the Faculty of Chemistry (Latvian University — Riga) special investigations were carried out by the Fishery Laboratory (J. Ozolinš) regarding the proportional coefficients of salt compounds in relation to the Cl-ion. An exact experimental examination of the validity of the Knudsen formula relative to the salinity conditions in the Baltic waters demonstrated that in the Gulf of Riga and in the Baltic Sea the salinity calculated according to the Knudsen formula is essentially less than the actual salinity obtained by direct determination of kations and anions. The results of these investigations were published in the "Publications of the Committee of Sciences of Lettish Society at Riga": "E. Zarinš and J. Ozolinš: "Untersuchungen über die Zusammensetzung des Meerwassers in der Rigaer Bucht und an der Küste Latvias" (1934).

Also investigations of boric acid contents of sea water in the waters bordering the Latvian coast were carried out. These results, together with those of the investigations mentioned above, have been prepared for publication also in the "Journal du Conseil".

The Marine Department (Ministry of Finances) continued water stage observations at the following points off the Latvian coast: 1. Ainaži (Renquist-Witting mareograph), 2. Salacgrīva (staff-gauge), 3. Daugavgrīva (A. Ott-limnigraph), 4. Mērsrags and 5. Roja (staff-gauge), 6. Kolkasrags (Renquist-Witting mareograph), 7. Ventspils and 8. Pāvilosta (staff-gauge), 9. Liepāja (Seibt-Fuess limnigraph), 10. Pape (staff-gauge). The results of the observations are sent to the Hydrographical Service of the Council and for Liepāja and Daugavgrīva partly published in the "Bulletin Hydrographique".

Sea current direction and velocity measurements were carried out from the light-ship "Laima" at Ovizi shallows by means of sheet-iron crosses of the type used in Finland. The results will shortly be published by the Department.

Hydrographical service was carried out along the W-coast of the Gulf of Riga from Mērsrags to Ragaciems. A new sea map of the same coast has been prepared for publication by the Department.

The State Meteorological Station (Ministry of Agriculture) continued ice observations from 10 positions and measurements of surface temperature in the sea at 10 points along the Latvian coast.

The Hydrobiological Station of the Latvian University (Director Prof. Dr. EMBRIK STRAND) continued regular observations regarding surface temperature and salinity in the Baltic Sea and in the Gulf of Riga on the same scale as in the year 1933. The results were published in the "Bulletin Hydrographique" and in the "Folia Zoologica et Hydrobiologica", Vol. VII.

Norway.

by OSCAR SUND.

North Eastern Area.

Directorate of Fisheries.

The vessels of the Directorate, the "Johan Hjort" and the "Virgo" as well as the vessel of the Geophysical Institute, the "Armauer Hansen", (hired for shorter periods) were used for the customary cruises as set out in the annexed table. Total no. of hydrographical stations 580, of T + S-observations 3887, oxygen 2044, pH 1738, phosphate 1639.

The surface observations on Norwegian liners to Iceland (to N. and S. Coasts resp.), to Newcastle and to Rotterdam, (all originating from Bergen) were continued without serious alterations: the thermograph used on the northern line to Iceland was not working well and was accordingly replaced by the same kind of instrument as is used on the other lines (the Negretti & Zambra pattern). Water samples were obtained from all lines during one of the resp. trips in Feb., May, Aug., and Nov. The charts are reduced to a convenient scale in rectangular coordinates and distributed as opalograph diagrams by the Bureau.

The Geophysical Institute, Bergen.

The series of coastal and fjord observations were continued by means of the Institute's vessel, the "Armauer Hansen". A list of cruises has been forwarded to the Administrative Secretary.

The Biological Laboratory of the University, Oslo has, in conjunction with biological work, executed a certain amount of oceanographical work in the Oslofjord and the Eastern portion of Skagerak and the Norwegian Deep.

The Tromsø Museum, has, by means of its vessel, the "Sparre Schneider", executed the customary yearly programme of monthly observations at 7 fjord and coast stations in the Tromsø district involving about 700 observations of each of the following elements: T, S, O, pH, P, NO_3, NO_2, and Ammonia 106 obs. In addition a small area on the outer coast, around Måkeskjær, yielded about 50 observations of each of the elements mentioned.

North Sea.

On the steamship routes Bergen—Newcastle a Bergen—Rotterdam the weekly temperature a salinity observations were continued.

Work planned in 1935:

I. The Fisheries Directorate.

Investigations in coastal waters and fjords from Ca Lindesnes to the Lofoten and Vesteraalen area fr January to May.

Surface thermograph observations will be start in March on coastal steamers between Bergen a Oslo (weekly) and between Bergen and Kirke (E. Finmark) (fortnightly), the instruments acqui for the purpose being from Negretti & Zamb London. When this service is started the number thermographs on Norwegian liners will be 6. T aggregate cost of running these 6 instruments will th be about 2,300 n. kr.

Three fixed oceanographical stations were start in February, one at Skrova in the West fjord (Lofot to be worked weekly until the end of April, later from November to March, one at Eggum, on t West side of Lofoten, same period, and one at Sogi sjøen, the mouth of the Sogne fjord, to be work weekly during the greater part of the year. Ea station provided with a hand winch with 300 m. wire and meterwheel, two Nansen waterbottles a 4 reversing thermometers. Three local observers ha been instructed. The gear has been adapted for ea installation on fishing cutters and might, in fi weather, even be used in a row-boat.

In the vessel "Johan Hjort" a recording magne striction echo sounder (British Admiralty patte has recently been fitted which proves highly efficie

II. The Geophysical Institute, Bergen, will in t period May—August by means of its vessel, t "Armauer Hansen", undertake a general investigati of the Norwegian Sea between latitudes 60 and 69 and as far west as the longitude of Jan Mayen.

III. The Biological Laboratory of the Universi of Oslo will continue observations in the same a as in 1934.

IV. The Tromsø Museum will continue the ser observations each month at the 7 stations in t Tromsø district. In April a special survey of t oceanographical conditions in West Finmark wat will be carried out by means of a hired vessel bef and during the spring cod fishery.

Poland.

by M. BOGUCKI.

Baltic Area.

I. The Marine Department of the State Meteo logical Institute at Gdynia continued regu observations as follows:

1. Surface temperature, salinity and sea le every day at 4 coast stations, O conte hydrogen ion concentration at 1 station.

2. Currents at three depths, transparency of the water, temperature and salinity at different depths, every 10 metres, at 4 stations on the line Gdynia-Hel, 2 times monthly.

The results of the hydrographical investigations from the trainingship "Dar Pomorza" concerning the depth, character of the bottom, temperature and salinity at 66 stations on the southern part of the "Mittelbank" were published in the Polish "Archives d'hydrobiologie et des pêches", v. VIII.

Studies of the correlation between the different meteorological (wind, air temperature, rainfall) and hydrographical factors (sea level, salinity, temperature of the water) are made and are to be published in the Report of the State Meteorological Institute.

Portugal.

by A. Ramalho.

ıtic Slope.

Data on temperature, chlorinity, salinity and y *in situ* (not taking in account correction ressure).

Other data. These comprise other chemical vations viz. Oxygen (O_2 O_2 100. O_2/O_2), pH, and NNO_3.

Scotland.

orth Sea.

in former years the regions covered by the ch vessel in 1934 were surveyed in respect of ydrographical characteristics of temperature and y. Distributed vertically and horizontally among stations', 1366 temperature observations and a umber of salinity values were obtained.

e data indicate that when open-sea work in the ern North Sea was begun by the "Explorer" end of March, the Atlantic or oceanic influence e region had already attained its maximum ity and, that this force was, in the early spring 34, somewhat stronger than usual. The abnor- y in this respect, however, lessened as the season ced but from August onwards, there was a l of the oceanic impulse into the Northern Area, n its climax than the spring maximum, but ently strong to carry over "transition" condi- into the true winter period which is generally cterised by almost complete homogeneity in the al sense in the physical conditions of the sea. face drift bottle experiments, continued during on the plan of the previous years, contribute ds this conclusion. Of a total of 1550 drifters ted during the year just over 400 have now been ered. The most significant feature of the results ıe year is the relative scarcity of British coast ıs from all liberations except those of the last months, November and December. Between ı and July there evidently was an increasingly strong easterly component in the normal southerly current off the Scottish East Coast. Floating or passive organisms would thereby tend to be transported eastwards from the British coast towards Denmark and Norway. Hydrologically, the effect would be towards the banking up of water on the eastern side of the North Sea. This effect appears to have been sufficiently long continued to produce a reaction commencing in August. This was at first counteracted by the secondary pulsation of Atlantic water, but later, as shown by the results of drift-bottle experiments the reactionary tendency developed, to culminate in November and December in a reversal of the main current direction off the east coast of Scotland out to the prime meridian at least, by which there was in these two months a transporting influence northwards all along the Scottish coast. A further effect of this reversal may be to delay the incidence of spring hydrographic conditions in the northern area in 1935.

S. North Sea.

Serial temperature and salinity observations were obtained at five stations in May and seven in August within the area. In May, surface hydrographic conditions on the northern half of the Dogger Bank were found to be slightly below the mean. The same condition prevailed in August in the offshore region between the Firth of Forth and the Dogger Bank.

Surface drift bottle liberations in both months have resulted only in continental recoveries, none having been recorded from the British coast.

Sweden.

by Professor Hans Pettersson.

Transition and Baltic Area.

Cruises: With the "Skagerak" to the Fladen shoal where series of observations from the ship at anchor combined with automatic registrations of internal waves by means of recording floats were carried out in July, to S. Baltic where observations partly from the "Skagerak" partly from the Ölands Rev lightship combined with internal wave-registrations were carried out in August.

Two shorter cruises in the fjords and off the west coast of Sweden for observations on submarine daylight and the transparency of and light-scattering in sea-water combined with hydrographic observations and plankton counts carried out in September and November.

Observations at Bornö Station: Daily hydrographic soundings down to 34 metres depth and automatic registrations of subsurface day-light and of the water-level in the fjord have been carried out throughout the year. An investigation on the photosynthesis of phyto-plankton in its relationship to the intensity of subsurface daylight was carried out from Bornö Station during March and April.

Lightship observations: Have been carried out as usual. A study of the heat stored in the waters of the Baltic during spring and summer and given off during autumn and winter based on ten years lightship observations has been published in "Fyrskeppsundersökningar 1932".

Laboratory work at Bornö and in Oceanografiska Institutionen, Göteborgs Högskola: Experimental study of boundary tides by N. Zeilon.

Experimental study of eddy viscosity H. Pettersson and H. Malmheden. Instrume constructed for observing submarine daylight a the transparency and scattering in sea-water H. Pettersson and S. Landberg. Study of radium and the uranium contents of sea-water B. Karlik and H. Pettersson.

Study of the radium content of deep sea depos by H. Pettersson.

PLANKTON COMMITTEE

1934.

Prof. H. H. Gran.

Belgium.

e Southern North Sea Committee, page 40.

Denmark.

by Prof. Ove Paulsen.

e work carried out in 1934 by the Plankton ratory of the Danish "Kommissionen for Dan- ts Fiskeri- og Havundersøgelser" may be described ie following items.

ood of the herring.

. Jespersen has continued his investigations ie food of the Baltic herring in the waters round holm. The work, which is carried out in co-oper- with the Danish Biological Station, started in 1932 and until January 1935 about 3,800 analyses omach-content have been made on Bornholm ngs.

aunistic work.

. Steemann Nielsen took part in the "Dana"s e to the Faroes and Iceland in the summer of .

orking up of the material from Iceland waters been continued. The microplankton is treated Prof. Ove Paulsen, the nannoplankton by Steemann Nielsen and the macroplankton by P. Jespersen.

n investigation of a large material of copepods the Davis Strait and the Baffin Bay, collected the "Godthaab"-Expedition 1928, has been luded and a paper published. A collection of pods from the East Greenland waters has been ed out in part but is not yet ready for public- n.

uring the year two reports on the phytoplankton the zooplankton in the Ringkøbing Fjord on west coast of Jutland have been published. eekly collections of plankton from three light- s in Danish waters have been continued.

Quantitative plankton researches.

Investigations on the plankton production in Icelandic waters, begun in 1932, have been inued, quantitative plankton samples having been collected during the 1934-cruise of the "Dana" to Iceland. Everywhere also contents of nutritive salts were determined. The countings, undertaken by Dr. Steemann Nielsen, are now finished for the years 1932, 1933 and 1934. A comprehensive publication is under preparation.

2. The working up of the material of the investigations 1932—1933 concerning the plankton production in Øresund (see report for 1933) has been continued. A publication will, it is hoped, appear in 1935.

3. Methods for quantitative centrifugation of plankton have been described.

4. Publications.

During the year the following papers were published:—

Jespersen, P.; "The Godthaab Expedition 1928. Copepoda." Medd. om Grønland, Bd. 79, Nr. 10. Copenhagen.

— "Undersøgelser over Sildens Føde i Forbindelse med Drivgarnsfiskeriet". Dansk Fiskeritidende, Nr. 22, 30. Maj 1934.

— "Planktonfaunaen i Ringkøbing Fjord og Nymindestrømmen 1915—30" (English Résumé). Ringkøbing Fjords Naturhistorie i Brakvandsperioden 1915—31. Copenhagen.

Nielsen, E. Steemann, "Phytoplanktonet i Ringkøbing Fjord 1915—31" (English Résumé). Ibid.

— und Brand, Th. v., "Quantitative Zentrifugenmethoden zur Planktonbestimmung". Rapports et Procès-Verbaux, LXXXIX.

Paulsen, Ove, "Plankton og Stofproduktion". Naturens Verden, Bd. 17, 1934.

The programme of the Plankton Laboratory for 1935 is to continue the investigations on the food of the herring, the faunistic work on Iceland plankton, the quantitative researches on the plankton production of the northern Atlantic and starting investigations on the plankton production in the Danish waters.

England.

by H. W. Harvey, Plymouth.

The plankton survey in the waters off Plymouth made in 1933 by Mr. H. W. Harvey was continued during 1934 in collaboration with Dr. L. H. N. Cooper, Dr. M. V. Lebour and Mr. F. S. Russell.

Observations were made at frequent intervals at a position 5 miles south-west of the Breakwater; these included the temperature, salt and phosphate content of the water, of the plants and of the animals caught between the surface and 45 metres depth by means of a silk net having 200 meshes to the inch attached to a meter, which measured the volume of seawater passing through the net. The species and numbers of the animals and plants were determined and counted by Mr. RUSSELL and Dr. LEBOUR and their phosphorus content determined by Dr. COOPER. An examination of the probable error in the diatom counts has been made by Mr. SPOONER. The quantity of "plant pigments" in the catches were determined and a close relation found with the numbers of diatoms present, if allowance were made for the small size of a few species.

The seasonal variation in abundance of diatoms was found to differ in detail from that found in 1933. It was again found in 1934 that the maximum population of diatoms occurring during the spring outburst contained only a fraction of the phosphorus which had been taken from the water. The abundance of diatoms showed a relation to the fluctations in numbers of animals grazing on them, a decreased abundance of animals usually occurring at the same time as increased abundance of diatoms, except in September.

From the phosphorus utilised by the diatoms and the phosphorus occurring in the diatom population, an estimate was made of the rate of diatom growth during March, a maximum value only being obtainable. This proved similar to rates observed for several quick growing species suspended in flasks in Oslo fjord in March (GRAN) and similar to the rate of growth during the beginning of a spring outburst in Loch Striven (MARSHALL and ORR).

The number of faecal pellets provided an index of the intensity of grazing, which varied greatly throughout the year. It indicates that, during periods of diatom abundance, the animals probably eat and excrete as green faecal pellets many times more vegetation than they need. During six weeks scarcity of diatoms in the summer, there was no evidence of zooplankton being reduced in numbers owing to starvation.

The investigation has opened up several speculative questions: as an instance — during the first part of the year diatoms utilised at least 14 mg. phosphorus in the form of phosphate from each cubic metre of water; the diatoms and zooplankton in a cubic metre never contained more than 2 mg.P.; regeneration of phosphate started in August and was not, as far as we know, preceded by any considerable mortality of animals; it is thought that phosphoproteins and phospholipins may dissolve into the water when diatoms are eaten and only partly digested.

As a second instance — after six weeks or more when diatoms were sparse, the animals, although very abundant, allowed a considerable population of diatoms to be built up in September before starting to eat them in quantity, as suggested by the numb of faecal pellets per animal. It is thought that t animals had been eating much organic detritus whi was abundant in the water. If the animals form preference for their accustomed food, such a preferen could also account for one species of diatom succeedi another during the early summer.

The counting of the catches of zooplankton h provided data of interest as they have given for t first time figures of abundance from a known volu of water in this region. The total number of anim retained in the silk net of 200 meshes to the in rose from a minimum of 183 in 100 litres of water January to a maximum of 7663 in August.

Further observations have been made by Mr. F RUSSELL on the composition of the Sagitta populati The complete displacement of *Sagitta elegans* by *setosa* which took place in the Autumn of 19 continued until the Spring of 1934 when a few *elegans* made their appearance. Throughout remainder of the year, however, *S. setosa* has s been easily the predominant species. Representat samples have been measured and the seasonal chan in size of *S. setosa* have followed very closely th found in 1931.

A number of new descriptions of the larval sta of molluscs, crustacea and polychaetes which oc in the plankton have been published by Dr. M. LEBOUR and Mr. D. P. WILSON.

Report from Lowestoft.

Intensive Plankton investigations were carr out during 1934. Ten cruises of the Research Stea "George Bligh" and eleven of the Motor Dri "Onaway" were made during the year.

The scheme of work included

1) Investigations on the ether-soluble matter dried plankton:
   a) Along the whole east coast area (June October).
   b) Monthly observations at six stations betw Flamborough Head and the South West Pa of the Dogger Bank (Jan.—Dec.).
2) Plankton of the northern grounds (Great Fis Bank etc.) in connection with herring food inves ations (May).
3) Investigations into the relation between abunda of plankton and hydrological conditions (Mont observations from May to September).
4) Relation between phytoplankton concentrati and the shoaling of herring. (October November).

The sampling of dried plankton for ether-sol matter continued over the same area as investigated in 1933. The values found along English coast in June and October were gener similar in distribution to those of the year bef except that the high values in the southern hal

ea in October were near to the English coast 4.

the Flamborough Line area the spring and n fat maxima behaved in the same way as in beginning off-shore and extending in-shore. On hole fat values reached higher levels in 1933 n 1934. Nearly pure samples of *Phaeocystis* sp. *eroe cucumis* gave 2.5 and 4.5% ether-soluble to dry weight.

ervations on the stage, length, sex and feeding *anus finmarchicus*, *Sagitta setosa* and *S. elegans* been commenced on the monthly stations oned in connection with the ether-soluble ments.

investigations under heading 3 were of a inary nature, intended as the first of a series continued for several years. The provisional s obtained are very promising. The plankton ed on the five cruises devoted to this work ed us to follow the distribution of the diatom *olenia styliformis* on the western side of the ern North Sea during the period from May to mber.

work under heading 4 was handicapped by reakdown of the "George Bligh" at the end of er, after two short cruises had been made for rpose of charting phytoplankton concentrations Southern North Sea. The work was continued g November by short cruises of the motor vessel. wo diatoms *Rhizosolenia styliformis* and *Biddul-sinensis* were again widespread, but the concen-ns were not so dense as in 1933. *Rhizosolenia* principally found north of Smiths Knoll L.V., *Biddulphia* extended across almost the whole e Southern Bight, being partially divided into by the tongue of salter water from the Channel. for the second year in succession *Biddulphia sis* was found in abundance on the English side e Southern Bight and it will be interesting to it establishes itself there. (It was also reported undant in the Thames Estuary in October and November, along with a few *R. styliformis*). Hardy of Hull University co-operated with the stoft Laboratory in this work (see below).

report on the phytoplankton investigations 1921—1932 has been published during the year nder[1]).

erring food investigations have been con-d as in previous years. The stomach contents arly 5,000 herring have been examined from the ds Area, and from the Great Fisher Bank, Viking and the Klondyke Grounds.

France.

par le Dr. Louis Fage.

nombreuses pêches planctoniques ont été utées au cours des deux croisières du "Président Théodore Tissier". Pendant la première croisière qui eut lieu dans la Mer du Nord et autour des îles Britanniques de Mai à Juillet 1934, les principales opérations ont été effectuées au S-W. de l'Irlande et de l'entrée de la Manche. La seconde croisière, qui s'est déroulée de Septembre à Novembre 1934 a permis l'exécution de 300 opérations planctoniques à travers l'Atlantique jusqu'à Terre Neuve et au Canada.

Le Dr. L. Fage, étudiant le matériel récolté durant la précédente croisière, a fait connaître la présence d'organes lumineux chez un Amphipode pélagique du genre Streesia.

Dans le même matériel, le Dr. G. Ranson a trouvé plusieurs exemplaires de la Méduse *Tiaranna affinis* dont il a pu faire une étude complète.

Germany.

Es wurde eine Veröffentlichung fertiggestellt[1]), in der ausser der Verbreitung der Fischbrut (W. Mielck†) die Methodik der Fischbrut- und Plankton-Untersuchungen (W. Mielck†) und die Verbreitung des übrigen Grossplanktons (C. Künne) in der Ostsee im Mai—Juni 1931 behandelt werden.

Die Untersuchungen über die Verbreitung des Grossplanktons im Herbst in der südwestlichen Nordsee und im Eingang zum Englischen Kanal[2]) wurden fortgesetzt.

Über die morphologischen Merkmale und die Unterscheidung der Leptomedusen *Helgicirrha schulzii* und *Eirene viridula* wurde eine Arbeit veröffentlicht[3]).

Die Bearbeitung der Oberflächenfänge von den Untersuchungsfahrten des "Poseidon" (Mai 1933) in die Deutsche Bucht und der "Weser" in die Hoofden (Nov.—Dez. 1933) wurde in den Berichten der D.W.K. (Bd. 7, Heft 3) veröffentlicht: es konnten je nach dem Ursprung der verschiedenen Wasserarten besonders charakteristische Plankton-Gemeinschaften festgestellt werden.

Es ist beabsichtigt, in gleicher Weise das Plankton bei Helgoland und in der inneren Deutschen Bucht unter Berücksichtigung der hydrographischen Verhältnisse möglichst laufend zu bearbeiten: Zu diesem Zweck wurde während des ganzen Jahres 1934 Oberflächenplankton aus diesem Gebiet gesammelt und z. T. schon bearbeitet.

Savage, R. E. and Hardy, A. C., "Phytoplankton the Herring". Min. of Agric. and Fisheries, Fish. st. Series II. XIV. No. 2. 1934.

[1]) W. Mielck und C. Künne, Fischbrut- und Plankton-Untersuchungen auf dem Reichsforschungsdampfer "Poseidon" in der Ostsee Mai—Juni 1931. Wiss. Meeresunters. N. F. Abt. Helgoland. Im Druck.

[2]) Cl. Künne, Die Verbreitung des Grossplanktons. In: A. Wulff, A. Bückmann und Cl. Künne, Bericht über die Teilnahme an einer Fischereischutzfahrt der "Weser" zu Untersuchungen über die Verbreitung der Heringslarven in der südlichen Nordsee und dem Kanaleingang, 7. November bis 15. Dezember 1933. Ber. d. Deutsch. wiss. Komm. f. Meeresforschung N. F. VII. Heft 3. 1934.

[3]) Cl. Künne, Über die Leptomedusen Helgicirrha schulzii Hartlaub und Eirene viridula (Péron und Lesueur). Zool. Anzeiger. Bd. 106, 1934.

Auf den Fischereischutzfahrten der "Weser" (Okt.—Nov. 1934) zur Doggerbank und in die nördlichen Hoofden und der "Elbe" (Nov.—Dez. 1934) in die Hoofden und den östlichen Kanal wurde ebenfalls Oberflächenplankton und hydrographisches Beobachtungsmaterial gesammelt, das in Zusammenhang mit den Ergebnissen der "Poseidon"-Fahrt im Januar 1935 in die Hoofden und den Engl. Kanal verarbeitet werden soll.

(Summary.)

A publication is in preparation dealing with the distribution of fish brood (W. Mielck), methods of fish brood and plankton investigation (W. Mielck) and the distribution of other large plankton (C. Künne) of the Baltic in May—June 1931 (Wiss. Meeresunters. N.F. Abt. Helgoland). Investigations of the distribution of large plankton in the autumn in the south-western North Sea and at the approach to the English Channel were continued (Ber. D.W.K., N.F. VII. H. 3, 1934).

A paper was published on the morphological characteristics and the differentiation of the *Leptomedusæ Helgicirrha schulzii* and *Eirene viridula* (Zool. Anz. Bd. 106, 1934).

The results of the surface catches on the investigational trips of the "Poseidon" in May 1933 in the German Bight, and the "Weser" in the Hoofden in November—December 1933 were published in the Ber. D.W.K. Bd. VII. H. 3; specially characteristic plankton communities could be distinguished by origin of various types of water.

Similar investigations of the plankton off Helgoland and in the German Bight on a continuous scale are planned in which hydrographic conditions are to be taken into account; to this end surface plankton was collected during 1934 from this area, and has in part been worked up. On the protection trips of the "Weser" in October—November 1934 to the Dogger Bank and Northern Hoofden and of the "Elbe" in November—December 1934 to the Hoofden and the Eastern Channel surface plankton and hydrographical observation material was collected to be worked up in conjunction with the results of the "Poseidon" trip in January 1935 to the Hoofden and the English Channel.

Hydrobiologische Abteilung des Zoologischen Staatsinstitutes in Hamburg, von Professor Dr. E. Hentschel.

Unter den Planktonarbeiten der "Meteor" Expedition (Wiss. Ergebn. Deutsch. Atlant. Exped. Bd. XI u. XII) wurde eine von Dr. Thiemann "Das Plankton der Flussmündungen" veröffentlicht, welche sich insofern auf das Arbeitsgebiet der Internationalen Kommission erstreckt, als sie eine quantitative Darstellung des Planktons der Mündung der Elbe enthält.

Plankton von den Shetlandinseln, gesammelt von Dr. Lissner 1926, und von Island wurde von Dr. Hentschel zu einer Untersuchung über Zusammensetzung von Copepodenbevölkerungen mit dem Körpervolumen der Tiere benutzt (Rapp. Proc.-Verb. Bd. LXXXIX, S. 93ff.).

Dr. Meschkat ging im August mit einem Fischdampfer nach Island und beschaffte Serien quantitativen Oberflächenfängen zum Zweck Feststellung tageszeitlicher Unterschiede, sowie Mageninhalte junger, noch Plankton fressender *Gadus merlangus*. — Die für den Frühling beabsichtigte Reise nach dem Isländischen Fischereigebiet (Vgl. Bericht für 1933/34) ist gefallen. Sie soll im Februar und März 1935 stattfinden.

(Summary.)

Among the planktonic studies of the "Meteor" expedition (Wiss. Ergbn. Deutsch. Atlant. Exped. Bd. XI and XII) a report was published by Dr. Thiemann on "Das Plankton der Flussmündungen" which so far relates to the work-plan of the International Council as it contains a quantitative presentation of the plankton of the estuary of the Elbe.

Plankton from the Shetland Isles collected by Dr. Lissner in 1926 and from Iceland was used by Dr. Hentschel for an investigation of the composition of the copepod population by bodily volume (Rapp. et Proc. Verb. Bd. LXXXIX page 93 et).

Dr. Meschkat during a trip to Iceland in August obtained a series of quantitative surface catches for the purpose of determining daily differences and stomach contents of young *Gadus merlangus* still feeding on plankton. The trip planned to Iceland fishing also for the spring of 1934 was postponed to February and March 1935.

Holland.

No report received.

Irish Free State.

Collections of Zooplankton were made during hydrographic cruises of the S.S. Muirchu by means of vertical townettings on seven short cruises, stations, throughout the year. The copepoda of the collections have for the most part been worked up in detail, the other organisms being retained for future examination.

Latvia.

No report received.

Norway.

Professor Gran and Dr. Braarud have during the year 1934 been occupied with the completion of the working up of the material, collected in the Bay of Fundy and the Gulf of Maine on the occasion of the question of embanking the Passamoquoddy Bay. The report has recently been finished and will be printed in the nearest future. Dr. Braarud has

d his manuscript concerning the researches d the sealer "Øst" in the ice-district in the rk Strait during 1924. For these reasons no work has been taken up.

Poland.

No report received.

Portugal.

No report received.

Scotland.

by R. S. Clark.

Scottish research vessel "Explorer" was in uous commission, except for part of September , from March to December. The cruises were l out mostly in the western half of the North ateau from the Dogger Bank to North Shetlands. g April and October the area between the nds and the Butt of Lewis was investigated. ay, observations were extended to the region Viking Bank and during July a comprehensive of the Northern North Sea was carried out en the Scottish and Norwegian coasts. On all ruises plankton investigations were carried out aneously with hydrographic and trawling rations. The Scottish plankton work was, as in ous years, concentrated largely on the distribution requency of occurrence of the pelagic young of the principal food fishes, and on the biology Copepod, *Calanus finmarchicus*. The examin- of the food of adult herring has been continued everal successful attempts have been made to ate the food of commercial catches with the composition of the plankton on the same ds and at the same time.

re was no evidence of any great invasion of forms into the North Sea during the year. were not observed in the area investigated and lids only very sparingly along the north of nd during October month. Several Cuttlefish *a officinalis*) were recorded from the northern Sea at the end of the year. These will probably urvive the winter conditions and, as has been ved on former occasions, there will most be a considerable stranding of the "bones" at certain localities in northern districts along the east coast of Scotland.

Spain.

No report received.

Sweden.

During the spring of 1934 an investigation was carried out from the Bornö Station in the Gullmarfjord concerning the relation between the assimilation of plankton algae and the intensity of submarine daylight. The experiment was made in such a way that glas tubes containing seawater samples with their natural content of plankton were kept submersed under the sea surface for a certain daytime together with a photocell connected, by means of a cable, to a pointer galvanometer on shore. By raising or lowering the tubes and the photocell according to the changing daylight the deflection of the galvanometer was kept constant and the tubes were thus, throughout the experiment, exposed to a natural light of constant intensity. The assimilation and the respiration in the plankton tubes were measured by determining the increase or decrease of acid in the tubes. The intensity necessary to make the assimilation and the respiration in the tubes equal was determined by varying in each experiment the intensity of the light incident upon the plankton tubes. The "intensity of compensation" of the actual plankton content used in the experiment was found to be about 400 lux. Details regarding the experiment are given in a paper by Hans Pettersson, Hans Höglund and Svante Landberg, "Submarine Daylight and the Photosynthesis of Phytoplankton".

Coinciding with an investigation into the saturation of light some 30 plankton samples were taken, in October and November, at 6 stations within and without the Swedish "Skärgård"; they were quantitatively determined according to Utermöhl's sedimentation method. This study coincided with the autumn growth of diatom which was extraordinarily strong. On some stations in the inner fjords more than 3 million diatom cells per litre were thus ascertained in the upper layers, the dominating species being *Sceletonema cordatum* and *Asterionella japonica*. In the open water the diatoms were much more scarce and the amount of individuals was not higher than 250,000 cells per litre.

Summary of Plankton Investigations on 1934-cruises.

ium.

S Victoire; Prof. Gilson; Jan. 13th—26th, 2nd—Apr. 20th: Belgian and French coastal rs: general plankton investigations.

S Zinnia; Prof. Gilson; 2 to 3 monthly cruises —May and Sept.—Dec.: S. North Sea: general kton investigations.

Denmark.

S/S Biologen; Dr. Blegvad; Apr. 4th—Oct. 24th: Transition Area: phytoplankton and zooplankton.

S/S Dana, Dr. Tåning; April 11th—May 25th: North Sea: Faroese and Icelandic waters: microplankton.

England.

S/S George Bligh; W. H. Stewart; May 16th—25th: phytoplankton and zooplankton in middle North Sea; May 15th—Nov. 31st: Graham, Wimpenny and Savage: phytoplankton in North Sea.

S/S Onaway; W. Johnson and R. S. Wimpenny; Jan.—Apr.: Flamborough Zone: phytoplankton, zooplankton.

S/S Salpa; H. W. Harvey and L. H. N. Cooper; monthly phytoplankton investigations S. of Plymouth.

Finland.

S/S Nautilus; Dr. Palmén, July 3rd—23rd: Gulf of Bothnia: quantitative plankton determinations.

France.

S/S Président Théodore Tissier; Dr. le Danois; May 10th—July 5th: S. Ireland, English Channel, North Sea; Sept. 1st—Nov. 7th, Dr. le Danois: N. Atlantic, Newfoundland, Entrance to St. Lawrence river, Azores: zooplankton.

Germany.

M/S Augusta; Dr. Bückmann or Holtmann; monthly cruises in Helgoland waters: surface phytoplankton observations (Jan.—Febr.: macroplankton observations as well).

S/S Elbe; Dr. Bückmann; Nov. 8th—Dec. 14th: Flemish Bight — English Channel: macroplankton and phytoplankton observations.

S/S Weser; Dr. Bückmann; Oct. 2nd—Nov. 5th: Doggerbank, Flamborough Head, northern part of Flemish Bight: macroplankton and phytoplankton.

S/S Meteor; Oct. 1st—Nov. 9th: Icelandic waters: ?

Irish Free State.

S/S Muirchu; G. P. Farran; Febr. 13th—20th 24th—25th, Aug. 7th—8th, Nov. 15th—17th coast of Ireland; June 6th—14th, Aug. 22nd— S. coast of Ireland: zooplankton.

Norway.

M/S Johan Hjort; Dr. Runnstrøm; Febr. Mar. 17th: Norwegian coast: zoo- and phytoplan O. Sund: Mar. 24th—May 9th: Lofoten dis diatoms and crustaceans; Eggvin: May 14th— 16th, Sund: June 18th—July 20th, P. Bjer Sept. 7th—22nd: Sogn and Hardanger fj general plankton observations.

M/S Armauer Hansen; Dr. Runnstrøm; Jan. 2 Febr. 3rd, Mar. 17th—Apr. 14th; Soleim: Febr. Mar. 12th; Norwegian coast: zoo- and phytoplan

M/S. Sparre Schneider; Soot-Ryen: mo zooplankton observations and quantitative p plankton observations at beginning of each m

Scotland.

S/S Explorer; Mar.—Apr.: N.W. North Sea; A May: Mid. North Sea; general plankton condit May: N.W. and N.E. North Sea, zooplankton in ge and the distribution and frequency of occurren *Calanus*. June—July: gen. plankton cond. Mid. North Sea, gen. plankton cond.; Fladen Gro distribution and abundance of plankton orgar forming the food of the herring. Oct.—Dec.: and Mid. North Sea, prevailing plankton condit

Sweden.

S/S Skagerak; Prof. Hans Pettersson or K Landberg; Nov. 28th—Dec. 4th: Kattegat Swedish fjords: general plankton observations.

SALMON AND TROUT COMMITTEE
1934.

Prof. M. Siedlecki.

ordance with the decision of the last meeting he Salmon and Trout Committee the reports ifferent countries contain indications as to tch of the Salmonoid fishes, the activity of ries and reports on the investigations made. he reports it may be concluded that the year general, can be characterized as a good salmon- The following investigations were made by t countries:

Denmark.

al Investigations.

ing experiments with sea trout have been out in water-courses in the southwestern l. Scales of sea trout and salmon have been d from various waters in Jutland as well as he Baltic, around Bornholm.

ontinuation of previous years' work material en collected as to length and weight of sea aught in the river Gudenaa and in the Randers

"pond-salmon" mentioned in last year's have now (winter 1934/35) spawned for the ne. The fry obtained from their 1st spawning rown up in ponds and have now spawned for t time. These pond-salmon have a smaller than the salmon in the sea.

stigations into water-courses as to the amount l available, and conditions in general for fry, r to determine the optimal amount of fry to rated, have been carried out in continuation ious year's

ishery for Salmon and Sea Trout round Born- lm in 1933.

fishery by hooks in the open sea which com- d in November of the previous year was con- until February 1934; the yield was somewhat than in the previous season (1932/33). After ose of the hook fishing, the drift net fishery open sea and along the coasts was started. shery finished in May; its yield was somewhat normal.

Statistics for the year 1933. (From "Fiskeri-Beretning 1933", Danish Board of Fishery.)

Catch in:	Salmon kg.	Trout kg.
North Sea and Skagerak incl. the Fjords	4,026	1,598
Limfjord	0	57,270
Kattegat and the Sound	11,902	23,643
Belt-Sea	4,214	15,748
Baltic	134,202	8,705
Total...	154,344	106,964

The yield of the salmon fishery has been somewhat lower, and that of the sea trout fishery slightly higher than those of 1932.

Output of fry (in thousands) of sea trout	tiny fry	half-yearlings
In watercourses leading to the:		
North Sea	495	109
Limfjord	819	24
Kattegat	1,120	123
Belts	513	—
Western Baltic	105	—
Baltic proper	151	—
Total...	3,203	256

12 millions of tiny fry of the *Coregonus lavaretus* were liberated in water-courses leading to the North Sea. Smaller amounts of fry of other salmonoid fishes (brown trout and rainbow trout) were liberated in open waters as well. No fry of salmon were liberated.

Roughly speaking the number of sea trout fry liberated has been about the same as in 1932, while that of *Coregonus lavaretus* has been about 3 times as high as in 1932.

England.

Mr. T. Pryce-Tannatt informs the Committee, that no report will be prepared this year.

Finland.

During 1934 materials for scale-analysis of salmon were collected in Tornio, Kemi, Oulu, Kokemäki and Kymi rivers and in the Kemi estuary. Marking of spawned salmon was carried out in Kemi river.

The yield of last summer (1934) was greater than in recent years (the figures are not yet available).

Tiny fry of salmon was liberated in 1934; in Kemi river 676.9 thousands, in Oulu river 487.0 th., in Kokemäki river 129.0 th. and in Kymi river 118.9 th.; the total number of salmon fry distributed was 1,411,800.

Summer-old parrs were liberated: in Kemi river 19,978 exx., in Oulu river 9,800, in Kokemäki river 34,700 and in Kymi river 5,348 exx; the total number of distributed parrs was 69,726.

Privately 100,000 eggs of Chinook-salmon, sent from Oregon in U. S. A. were hatched; 73,000 tiny fry of *Oncorhynchus* were liberated in Kokemäki river and 8,000 in Noorkarkku river (a small river north from Kokemäki); 5,530 parrs were liberated in the autumn also in Kokemäki river, 600 of which were marked.

France.

No report issued.

Germany.

Im Jahre 1934 sind im Verfolg des im Jahre 1930 aufgestellten Lachsforschungsprogrammes die Bestandsanalysen der an der preussischen Küste auftretenden Lachse weiter fortgeführt worden. Insgesamt sind bisher 3064 Lachse der Treibnetz- und Angelfischerei untersucht worden. Der Prozentsatz an Meerforellen unter diesen beträgt 3.1. Die Grösse der Meerforellen, welche mit Treibnetz und Angel gefangen werden, ist fast stets über 60 cm. im Gegensatz zur Grösse der Meerforellen, die bei der Strandgarnfischerei zum Fang kommen, und der meisten zum Laichen aufsteigenden Meerforellen. Diese sind in der Regel unter 60 cm. lang. Die Längengrenzen der Treibnetz- und Angellachse liegen zwischen 43 und 135 cm., die weitaus überwiegende Mehrzahl aber fällt in die Grenzen zwischen 80 und 110 cm. Die Mehrzahl der Lachse ist 5—8 Jahre alt, nur wenige sind jünger (4 Jahre) und älter (bis zu 13 Jahren). Laichmarken werden verhältnismässig häufig, bis zu 12.5 %, gefunden. Begonnen sind Untersuchungen über die Strandgarnfänge, die in früherer Zeit eine bedeutendere Rolle gespielt haben als jetzt. Die genaueren statistischen Untersuchungen haben gezeigt, dass entsprechend der Umstellung der Fischerei von der Strandgarn- zur Treibnetz- und Angelfischerei die Grössenverhältnisse der angelandeten Lachse sich fast vollständig nach oben hin verschoben haben. Infolgedessen können die früheren Masse analytischer Untersuchungen für die heutige Lachsfischerei keine Geltung mehr besitzen.

Die Strandgarnfischerei kann nach den neueren Untersuchungen durch regelmässiges Aussetzen von Meerforellenbrut direkt in die Ostsee erheblich gefördert und auf eine neue Grundlage gestellt werden. Die Untersuchungen des Jahres 1934 haben erneut gezeigt, dass die Meerforelle nur mässige und an der südlichen Ostseeküste von Westen nach Osten gerichtete Nahrungswanderungen macht und zum Laich in ihre Heimatgewässer zurückkehrt. Sie entfernt sich nicht weit vom Aussetzungsort, so dass die Aussetzungen selbst für die eigene Fischerei des Aussetzungslandes von Nutzen sind. Die Zahl der wiedergefangenen markierten Meerforellen beträgt 5 %, die Zahl der wiedergefangenen markierten Lachse dagegen nur 0.6 %. Das schlechtere Wiederfangergebnis bei Lachsen entspricht den Angaben anderer Lachsforscher. Diese ungünstigen Ergebnisse sind darauf zurückzuführen, dass der Lachs weitere Wanderungen unternimmt und daher die Möglichkeit des Wiederfangs geringer wird.

Das Aussetzen markierter Lachse leidet auch noch unter den ungünstigen Aufzuchtverhältnissen. In der Versuchsteichwirtschaft Perteltnicken aufgezogene Lachsbrut ergab sehr verschiedene Lebensfähigkeit nach der Herkunft. Lachsbrut aus dem Rheingebiet liess sich am besten aufziehen, im Durchschnitt 23 % nach dem ersten Sommer, Lachsbrut aus Finnland nur 10 %, aus Schweden 7 %, aus Lettland 5 %.

Die Angelhakenmethode ist weiter ausgebaut worden und hat neue Erfolge gezeitigt. Bis 1934 sind 4 abgelieferte Wiederfunde zu verzeichnen gewesen, im Jahre 1934 sind 23 weitere Haken abgeliefert worden. Von diesen konnten 17 ihrer Herkunft nach identifiziert werden, bei 5 Haken war die Herkunft fraglich, bei 1 Haken liess sich keine Angabe machen. Auch das Jahr 1934 hat wieder gezeigt, dass eine Wanderung der Lachse von Westen nach Osten und dann weiter nach Norden erfolgt. Preussische Haken sind aus dem Nordteil des Bottnischen Meerbusens, ostpreussische Haken von Gotland zurückgeliefert worden, ein Bornholmer Haken ist im finnischen Meerbusen wieder gefunden worden. Neuerdings werden die in Ostpreussen verwendeten Haken vor der Ablieferung an die Fischer mit Ortschaftsbezeichnungen versehen. Von diesen 5—6000 Haken sind inzwischen bereits 1 zurückgelangt.

Versuche mit Bastardierungen von Bachforelle mit Meerforellen haben ein sehr gutes Ergebnis gezeigt. Das erste Jahr wird von den Bastarden in den Teichen unter sehr geringen Verlusten vollendet. Über die Rassenbildung, insbesondere hinsichtlich des Wachstums, sind weitere Untersuchungen vorgenommen worden. Insbesondere ist auch die Entwicklung des Schuppenbildes im Vergleich zwischen Süsswasser und Seewasser studiert worden.

Die Untersuchungen über die Nahrung der Lachse und die Lebensgeschichte der Nahrungstiere haben gezeigt, dass eine enge Abhängigkeit der Nahrung von den Lebenserscheinungen der Nahrungsfische besteht und dadurch ein bestimmter zeitlicher Wechsel in der Nahrung bedingt wird.

Neben den eigentlichen Lachsforschungsarbeiten sind noch ergänzende Arbeiten ausgeführt worden. In erster Linie sind hydrographische Untersuchungen in und vor den Lachslaichgewässern ausgeführt worden, die sich auf Salzgehalt, Sauerstoffgehalt, Gesamtphosphor, Phosphat, Nitrat und Nitrit sowie Silikat beziehen. Ausserdem sind in dem Frischen und Ku

Haff weitere biologische und hydrographische chungen vorgenommen worden, da diese e Durchgangsgewässer für den Lachs sind.

(Summary.)

analyses of salmon appearing off the Prussian were continued in 1934 in accordance with 30 programme of salmon investigations. Up time 3064 salmon taken by drift-net and l been examined, among which were 3.1 % trout. The size of these sea trout is nearly over 60 cm., as contrasted with those taken e-net fishery and most of those ascending for ng, which are generally under 60 cm. The length drift-net and line salmon lies between 43 and , the majority between 80 and 110 cm. The the majority of the salmon lie between 5 ears, a few being younger (4 years) and older 13 years). Spawning signs are relatively t up to 12.5 %. Investigations have been nced into the shore-net catches which used greater importance than to-day. More precise cal investigations have shown that corre- ng to the change from shore-net to drift-net e fishery, the size ratios of salmon taken have invariably risen. Consequently the earlier l of analytical investigations is no longer of or the present salmon fishery.

rding to recent investigations the shore-net can be fostered by regular setting out of ut brood direct into the Baltic. The invest- s of 1934 have again shown that the sea- makes only moderate feeding migrations and to its home waters for spawning. It does not far from where it was set out, so that such ion benefits the national fishery of the country g out the work. The number of re-captured sea-trout amounts to 5 %; that of re-captured l salmon to only 0.6 %. The lower figure in of salmon confirms the findings of other investigators and may be ascribed to the distance migrations made by the salmon. The out of marked salmon still suffers from un- able breeding conditions. Salmon brood raised Perteltnicken Experimental Farm showed varying vitality according to origin. Brood he Rhine area showed best results, 23 % after st summer, from Finland only 10 %, from a 7 % and from Latvia 5 %.

line fishery has been further improved and increased success. Up to 1934 re-captures l over numbered 58; in 1934 twenty-three hooks were handed over; of these 17 could ntified by origin, 5 were of doubtful origin and ne hook there was no mark of identification. 34 a migration of salmon from West to East en further northwards was also proved. Prussian were returned from the Gulf of Bothnia, East an from Gothland and one Bornholm hook covered in the Gulf of Finland. Latterly the hooks used in E. Prussia have been furnished with locality markings before being given to the fishermen. Of these 5—6000 hooks 4 have so far been returned.

Experiments with hybridisation of river and sea trout have had good results. The hybrids completed their first year in the ponds with very little loss. Further investigations are being made on racial formation particularly in respect to growth. The development of the scale-form in comparison between fresh water and sea water has also been the subject of special study.

Investigations into the food of the salmon and the life history of the food animals have shown that there is close dependence of food upon life-phenomena of the food fishes, and consequently a definite temporal change in feeding.

The salmon investigations proper have been supplemented by other studies. Hydrographical observations have been carried out in and above the salmon spawning waters in respect of salinity, oxygen content, phosphorus total, phosphates, nitrates and nitrites as well as silicates. Further biological and hydrographical investigations have been planned in the Frisches and Kurisches Haff, since these are important transitional waters for salmon.

Irish Free State.

The Catch of Salmon in 1934.

The run of salmon in 1934, as deduced from the quantity exported, was 28 % better as regards weight, and 15 % better as regards value than that of 1933, and in the past 10 years was only exceeded in 1927 and 1932. The catch for each month, in kilogrammes was as follows: January 1,912, February 81,900, March 120,600, April 124,870, May 212,200, June 474,750, July 261,180, August 32,520, September 914.

The total catch for the season was 1,312,847 kg. having a value (wholesale) of £ 221,704. The run of Small Spring Fish (2 years in the sea) and Large Spring Fish (3 years in the sea) was below the average of recent years but this was more than compensated for by a very large run of grilse (some 15 months in the sea) in June and July.

Artificial Propagation.

During the spawning season of 1933—34 the weather was very dry and the rivers were low. In many districts the spawning fish were unable to ascend to the upper stretches of the rivers. There was, however, a plentiful supply of spawning fish available for the various hatcheries. 24 hatcheries were operated, of which 12 were stocked with eyed ova distributed from some other hatchery. Salmon ova were collected at 9 hatcheries, sea trout at one hatchery and brown trout at 6 hatcheries.

The total number of fry distributed was:

Salmon fry	6,697,000
Sea trout fry	69,000
Brown trout fry	1,094,000
Total	7,860,000

These results are almost identical with those achieved in the 1932—33 season.

Biological Investigations.

During the year 1934, investigations on the growth and food of brown trout were continued. Quantitative estimations were made of the amount of trout food available in two markedly different environments.

During the year the following papers were published:

R. Southern. "The Food and Growth of Brown Trout from Lough Derg and the River Shannon." Proceedings of the Royal Irish Academy, Vol. XLII, Sect. B, No. 6, 1935.

— "The Salmon Fishery; A Statistical Survey of the Industry". The Irish Trade Journal, September and December, 1934.

Latvia.

1. The Catch of Salmonidae.

The catch of Salmonidae (*Salmo salar* and *S. trutta*) along the Latvian coast of the Gulf of Riga and the Baltic proper in the year 1934 amounts to 114,310 kg. The yield is somewhat below that of the preceding year (128,058 kg.) but superior to the average quantity of Salmonidae landed in the years 1924—1933 (99,520 kg.).

The occurrence and the catch of Salmonidae in the sea along the Latvian coast is generally connected with the location of the estuaries of the principal spawning rivers e. g. Daugava, Gauja, Salace, Venta. The Daugava being the most important spawning river for salmon and the Gauja for sea trout respectively, the main yield of Salmonidae is made in the southern part of the Gulf of Riga where 74.4% of the average total of Salmonidae is landed, the sea-shore of Vidzeme with the estuary of the salmon spawning river Salace giving 14.2% and the western sea-shore of the Gulf of Riga (coast of Kurzeme) yielding only 1% of total capture of Salmonidae. Also of minor importance is the salmon fishery in the region of Kolkasrags, between the Baltic proper and the Gulf of Riga, where only 1.4% of the total catch of sea Salmonidae is landed. The share of the salmon fishery in the open Baltic Sea amounts only to 9% of the total weight of capture, 5.5% being landed in the fishery region of Ventspils with the estuary of the river Venta and 3.5% in the region of Liepaja.

The salmonoid fishery in the Gulf of Riga is carried out by means of trawls (drag nets) and great salmon baskets, in the Baltic proper in the Ventspils region drift nets as well as drag nets are used, whilst in the salmon fishery of Liepaja lines are the gear mainly used.

Statistics of Salmonidae Fisheries in the Year 193

Region I. Gulf of Riga.	
a. Coast of Vidzeme.....	14,450 kg.
b. Riga sea-shore.....	85,350 -
c. Coast of Kurzeme.....	820 -
Total in the Gulf of Riga...	100,620
Region II. Kolkasrags.....	2,660
— III. Ventspils.....	7,070
— IV. Liepaja.....	3,960
Total catch of Salmonidae on the Latvian sea coast.....	114,310

Artificial Propagation.

In the spring of 1934 the following quantities salmon and sea trout hatched in the State F Hatchery at Tome and in its branch hatchery Karli were distributed as tiny fry:

Salmon.		
Daugava.....	2,800,000	
Salace.....	250,000	
Gauja.....	200,000	
Total...		3,250,
Sea Trout.		
Gauja.....	1,000,000	
Daugava.....	400,000	
Total...		1,400,
Lavaret.		
Daugava.....	1,200,000	
Gauja.....	1,000,000	
Salace.....	300,000	
Total...		2,500,

Also about 11,500,000 of *Coregonus genera* (Peipus-Lake whitefish) were hatched and libera in Latvian lakes.

In the season 1934—1935 the following quanti of eggs were stocked in the State Hatcheries cultivation:

Salmon.....	3,400,
Sea Trout.....	5,986,
Lavaret.....	3,000,
Whitefish.....	19,800,
Brown trout.....	22,

Preparatory work was carried out for a new S Salmonidae Hatchery, which is to be erected the river Venta near Kuldiga in the year 1935.

Biological Investigations.

The Fishery Laboratory of the Ministry of A culture continued the collection and the study the material collected relating to the age-distribu and growth-rate of the salmon from the Gulf of R In the Gulf of Riga a number of undersized sal and sea trout were reliberated after marking

silver plates attached to the basis of the dorsal
means of silver wire.
experiments on rearing smolts in artificial
were continued at the State Hatchery at Tome.

Poland.

catch of Salmon and Sea Trout in the
Sea was not — in general — as favourable
previous years. The total catch amounted to
0 kg. of salmon. The total catch of sea trout
e sea) was 3370 kg. — Reliable figures concerning
atch of the Salmonoid fishes in the rivers were
obtainable. Detailed statistics of the salmon
es are as follows:

salmon.....	60,930 kg.	or	7018	specimens
salmon (below cm.).....	3,590	- -	7604	—
rout.....	3,370	- -	1457	—

e average weight of large salmon was higher
in 1933 and 1932.
e catch of small salmon (*mielnica*) was by far
er than in previous years. In 1932 the number
lividuals captured was 50,008 and in 1934 only
. Such a striking diminution of the results of
y for small salmon is partly due to restrictions,
of the good fishing grounds situated in the
bourhood of the ports being now closed to the
y.
e artificial propagation of the salmonoid fishes
not sufficient during the season 1934/35. Ter-
floods were the main cause of such a state.
he hatchery near Wilno 50,000 eggs of salmon
developed and the tiny fry liberated in the
h rivers. In the hatchery near Nowy Targ only
00 eggs of sea trout were developed, the traps
for the catch of spawners being destroyed by
flood. After the flood natural spawning was
ved in several places further up the rivers than
l.
e results of the investigations concerning the
sis of the population of salmon in 1931, 32 and
ere published by Mr. B. Dixon in the Journ. du
eil (Vol. IX, Nr. 1, 1934). Scales were collected
urther investigations.
rking experiments were continued. 3400 one
vo years old fishes were marked and liberated in
rent rivers belonging to the system of the Vistula
salmon and 2830 sea trout). In addition 19 three
s old salmon caught in the Baltic were marked
reliberated. Experiments with the young river
ts (*Trutta fario* and *Salmo fontinalis*) marked
liberated directly in the Baltic Sea were continued:
young trout were liberated some five miles NE.
E. from Gdynia. The results of a part of these
riments were published by Dr. W. Kulmatycki
erhandl. des Intern. Vereines für theor. u. angew.
nologie, Vol. VI. Returns from these and previous
xing experiments were not very numerous. The
interesting facts are as follows: One sea trout liberated near the Polish coast in December 1931 was recaptured as a mature fish, 830 mm. long, in 1934 in Egernsund on the Danish coast. This fish (unfortunately after removal of the silver mark) was again liberated in the sea. This recapture proves that the sea trout in the Baltic Sea is capable of long migrations, a fact which has been proved also for the Scottish sea trout. — But one sea trout from the river Dunajec, marked and liberated in the river Brda in November 1933 was recaptured at the same place in December 1934, which makes it probable that some of the young fish may remain a long period at the same part of the river without descending to the sea. — The brown trout liberated near the Polish coast migrated westwards (one was captured near Kolberg) or to the mouth of the Vistula. — Out of 19 young salmon (mielnica) marked and liberated near the Polish coast, one was recaptured three months later in Finland. This proves that "mielnica" do not remain long in the southern part of the Baltic sea.

Portugal.

No report issued.

Scotland.

Salmon and sea trout investigations have continued on the same lines as in previous years with the addition of one further piece of research.

The principal matter of interest was the recapture during the year of 407 of the 2585 sea trout marked in the Montrose area during 1933. The proportion of recaptures, 15%, is unusually high and while the majority of fish were retaken close to the place of marking, but after an interval of normally three to six months during which they had made a feeding migration, others had travelled considerable distances. Recaptures were made along the coast and in the rivers to the North as far as Beauly at the head of the Moray Firth, some 175 miles from the place of marking. A number of sea trout were also retaken in the Tay, 50 miles south of the place of marking, the Forth, 100 miles south and down to the Northumberland coast 100 miles.

One exceptional fish was taken by a trawler in the Clay Deep to the North of the Dogger Bank and at least 200 miles from Montrose.

The results show that while many of the marked fish were native of the three rivers in the neighbourhood of the place of marking and were returning there on recapture, others were visiting the locality as a feeding area. The Montrose coast carries a large population of Ammodytes species and at times large quantities of herring in the youngest stages are found in the waters. From this feeding area the sea trout recaptured north and south of the place of marking were returning to their native rivers.

The recaptures as well as providing information on migrations have also given data regarding scale formation. This data confirms previous experience in Scotland but is valuable as its direct character

replaces the deductive reasoning on which some of the scale markings had previously been interpreted. The formation of a winter band may commence as early as November, but, on the other hand, clean adolescent sea trout remaining in fresh water over the winter may form a small band of narrow ridges on their scales when they return to salt water in March or April. Confirmation of the formation of a spawning mark was also given and evidence was obtained of the time of formation of the false checks during the summer growth.

In the course of work in the South Esk in the Montrose area a number of kelt sea trout were taken some 15 kilometres up the river during the months of February, March and April which had started to form a spawning mark although they had apparently not yet returned to tidal or salt water. It was hoped that further investigation of this problem might have been made last year but owing to floods at the critical period it was not found possible to do the necessary netting.

Papers on the details of migratory movements and of scale development are in course of preparation. Papers have also been published on the scale material previously collected from the Montrose area and on the sea trout of Lewis and Herris, which form the northern part of the Outer Hebrides, the most westerly of the Scottish Islands.

A paper has also been published on the salmon of the River Tay based on a collection of 1,795 scales and measurements. Two outstanding results have been obtained from this work. The first is: unusual absence of small spring (two winters) salmon in the year of investigation. The second is that the known fact that the spring fish and the summer fish resort to different parts of the watershed for spawning purposes is recorded in different rates and types of parr growth on the scales. The proportion of previously spawned fish, 4.4%, is similar to that in the rest of the large rivers of the east coast of Scotland, but the proportion of large spring (three winters) fish, 21.7%, is much higher than in any other district.

The report on the investigation of the food of sea trout which was carried out in the previous year and which has now been issued, shows that in the Montrose area the food of sea trout includes *Ammodytes sp.*, *Clupea sprattus*, *Clupea harengus* and *Gadus merlangus*, while somewhat surprisingly, the remains of *Pleuronectes microcephalus* were found in some specimens. *Gammarus marinus* was also taken.

The new piece of research referred to above consists of an investigation of the process by which the absorption of the scales takes place during the fresh water life of the migratory salmonidae. This investigation has not yet progressed very far and the preliminary research was considerably hampered by the extreme difficulty of cutting satisfactory sections of the skin with the scales *in situ*. The results so far as obtained at present show that the absorption is accomplished through the phagocytic action of cells in contact with the scale margin. These phagocytic cells are more numerous than the cells in the su rounding and they push inwards as the scale di appears, evidently also preferentially attacking t hyalodentine layer.

During the year a paper on the "Design a Construction of Salmon Passes at obstructions n greater than three or four metres in height" w published. In this paper the essential consideratio necessary before a pass can be designed were discuss and plans and devices to meet various situations a given. A further paper on the construction of salm passes at larger dams, up to 25 or more metres height, is in preparation.

Run of Salmon.

The chief feature of 1934 was the exceptional good run of grilse. In June and July these you fish were more plentiful than in any recent ye and the season forms a culmination to the improveme which has been progressive during the last five yea From 1900 to 1920, with few exceptions, grilse throug out the whole of Scotland declined until the cat was only about one-third of the former numbe Between 1920 and 1930 the general low level w continued reaching a minimum between 1925 a 1929. Now, as stated, the recovery in the last five yea has been rapid. The whole of the recent phenomen is almost entirely due to natural causes. None of t improvement can be ascribed to hatchery operatio and at the most not much of it to any reduction netting and consequent improvement in the spawni stock. Grilse this year were in exceptionally go condition and about half a kilogramme heavier th usual.

The decline in grilse in past years was accompani by a very marked increase in the number of spri fish, and it has been suggested that the two occ rences were not unconnected. No proof of this su gestion exists, however, and during the last four five years when the stock of grilse has again improv almost to its former level there has been no cor sponding decline in the run of spring fish. In 19 large spring, 3 winters, fish were rather over t average in numbers; two winters, small spri fish were very plentiful early (December, Janua and early February) in the season but thereaft during the remainder of February, March and t early part of April, there was a curious and widespre decline in the numbers coming in from the sea. the latter half of April and in May, however, t numbers were again quite up to the average. Summ 2+ winters, fish were moderately plentiful b autumn, 2+ and 3+ winters, fish in August, S tember and October were very scarce. This l state of affairs has been common to all recent yea The autumn salmon have declined with the decl in grilse during this century but they have shown recovery, as have the grilse.

The feature of the sea trout season, which w average in point of numbers, was that the fish w larger than usual and in exceptionally good conditi

least two rivers, however, of the west coast for in July and early August the sea trout were dly thin and this fact confirms what previous ence had suggested that the sea trout of nt districts have widely separated feeding ds.

ics of Catch.

approximate catch of salmon and sea trout t in Scotland during 1934 was 1,350,000 kg. s about 50,000 kg. better than 1933. The details ot available to enable the gross total to be d into the two species, salmon and sea trout, o monthly catches. For the various parts of oast, however, the catches are:

ck to Moray Firth.....	730,000 kg.
Firth and North Coast.....	445,000 -
Coast to Firth of Clyde.....	105,000 -
of Clyde and Solway Firth....	70,000 -
Total...	1,350,000 kg.

ial Propagation in Scotland.

ificial propagation of salmon and sea trout ntinued on a very restricted scale. The tendency hatcheries to decrease rather than increase in ers, partly owing to lack of faith in the results ced and partly owing to the difficulty (due to etc.) of obtaining sufficient spawning fish to yield even a million ova or less for quite a small hatchery.

Marking Experiments.

2585 sea trout were marked in the latter part of 1933 in the Montrose area and 407 recaptures were made. From practically the whole of the recaptures full details of weight and length and also some scales were obtained so that the material is valuable not only for showing migrations but also for showing scale and growth rate and scale formation. It is hoped to present a short paper on the results at the Meeting during 1935.

In 1934 marking experiments were also started in the Kyle of Sutherland, on the northern side of the Moray Firth, and these are being continued in 1935. Considerable difficulty has been experienced in getting a sufficient number of fish but further attempts are being made.

Spain.

No report issued.

Sweden.

The report by Dr. GUNNAR ALM, published as a special volume of Rapp. et Proc.-Verb. in 1934, contains a detailed study of the Swedish salmon fishery and can be considered also as a report on the respective work carried out by the Swedish scientists during later years.